

# A REVISION OF *MELALEUCA LEUCADENDRON* AND ITS ALLIES (MYRTACEAE)

By S. T. BLAKE

Queensland Herbarium, Brisbane

## SUMMARY

The name *Melaleuca leucadendron* (L.) L. has been used in a very broad sense but correctly refers to one of a complex of ten species distinguished by hitherto overlooked characters in the sepals, indumentum, stamens and foliage correlated with differences in habit.

*M. saligna* Schau., *M. arcana* sp. nov. and *M. stenostachya* sp. nov. have smaller flowers and fruits than the others; the name *M. saligna* has been generally misapplied. *M. nervosa* (Lindl.) Cheel, *M. argentea* W. V. Fitzg. and *M. dealbata* sp. nov. have an indumentum consisting partly of minute, erect, crisped hairs and the sepals are thickened nearly to the margins with the indumentum covering most of the outside. The other species, *M. leucadendron* (L.) L. (*M. mimosoides* Schau. etc.), *M. cajuputi* Powell (*M. minor* Sm. etc.), *M. viridiflora* Sol. ex Gaertn. (*M. cunninghamii* Schau.) and *M. quinquenervia* (Cav.) S. T. Blake (to which the name *M. viridiflora* has been misapplied), lack these minute crisped hairs and the sepals have a broad membranous marginal band that is glabrous except for a few short hairs at the extreme edge; *M. leucadendron* is glabrous, but the others are hairy at least on the young shoots. All groups have broad-leaved species and narrow-leaved species but the form of the leaf varies with the size of the tree.

Failure to appreciate some more obvious differences and misapplication of names have made it necessary to consider eight other species that are not closely allied, some of which presented taxonomic and nomenclatural problems of their own; these are *M. deanei* F. Muell. (the only species not studied in the field), *M. groveana* Cheel & White, *M. sieberi* Schau., *M. lanceolata* Otto (*M. pubescens* Schau.), *M. preissiana* Schau., *M. decora* (Salisb.) J. Britten, *M. bracteata* F. Muell. (*M. glaucocalyx* Gandoger, *M. genistifolia* var. *coriacea* Ewart, Kerr & Derrick, *M. daleana* Blakely, *M. monticola* J. M. Black) and *M. lasiandra* F. Muell. About ninety names are involved, of which thirty-one are "new" synonyms. Of *M. leucadendron* and the nine species most closely allied to it, about seven hundred collections have been studied, of which four may represent hybrids, but three species are together represented by less than 5% of the collections.

## I. INTRODUCTION AND ACKNOWLEDGEMENTS

This paper is mainly a revision of the taxa that have been associated with the name *Melaleuca leucadendron*. This was based on *Myrtus leucadendra*, a name proposed by Linnaeus for the plants described and figured by Rumphius in *Herb. Amboin.* 2: 72, 76, tt. 16-17 under the names of *Arbor alba* and *Arbor alba minor*. Since the time of Linnaeus many names have been proposed by various workers for forms more or less differing from the form believed by



the particular author to be *M. leucadendron*, but at any one time no author has admitted the existence of more than eleven taxa. The following quotations illustrate the attitude of some experienced workers in this group. (All names italicized and epithets without initial capitals.)

"One species, the old *M. leucadendron*, Linn., the only one which from Australia spreads itself over the Indian archipelago and the Malayan peninsula, is, with this very wide geographical range, also singularly polymorphous. It has been divided into more than a dozen species; and most botanists retain two, three, or four as distinct, the extreme forms being widely dissimilar; but the characters, derived chiefly from the shape and size of the leaves, from the dense or interrupted spikes, from the size and colour of the flower, and from the indumentum, are so variously combined in different specimens, the forms at other times pass so gradually one into the other, or differ so much at different ages, or even on different branches of the same tree, that I have completely failed in the endeavour to sort the specimens into distinct races" (Bentham, J. Linn. Soc. Lond. Bot. 10: 139 (1869)).

"This species, very widely spread and abundant in the Indian Archipelago and Malayan Peninsula, varies exceedingly in the size, shape and texture of the leaves, in the young shoots very silky or the spikes silky-villous or woolly or the whole quite glabrous, in the short and dense or long and interrupted spikes, in the size of the flower, in the greenish-yellow, whitish, pink or purple stamens, etc., and at first sight it is difficult to believe that they all can be forms of one species, but on examination none of these variations are sufficiently constant or so combined as to allow of the definition of distinct races" (Bentham, Fl. Aust. 3: 142-3 (1867)).

"I am inclined to consider *M. minor*, *M. cajuputi*, *M. viridiflora*, *M. mimosoides*, *M. saligna*, *M. cunninghami* and *M. cumingiana* all as mere forms of this species, produced by the diversity of localities occupied by the species. The shape of the leaves and the color and length of the stamens are equally variable" (F. Mueller, Essay on the Plants collected . . . during . . . expedition to the . . . Burdekin, 7 (1860), under *Melaleuca leucadendron*).

"This species varies in an astonishing way; in moist valleys and on repeatedly flooded river banks it is splendid in the form of a lofty tree; on the sandstone tableland it forms only a small tree or shrub. The filaments are cream or pale yellow, and vary greatly in length; at times the bundles cohere at the base in a ring as is also the case in *Callistemon lanceolatum*, but more often they are free; sometimes the filaments of each bundle are united only slightly, sometimes very conspicuously so" (Translated from F. Mueller, Fragm. 4: 55 (1864)).

. . . "it seemed to me that at least nine (if not more) species or well-marked varieties were included under the name *M. leucadendron* . . . A more close examination of the plants in the field, as well as a

systematic examination of the development of the seedlings, may enable one to raise the various forms or varieties enumerated here as species, but, until this has been done, it seems wiser to regard them as off-shoots of *M. leucadendron*, and to give the various forms varietal names . . .” (Cheel in Ewart & Davies, Fl. North. Territ. 293–294 (1917)).

“I cannot class all the various forms allied to *M. leucadendron* L. as varieties, as done by King (“Materials for a Flora of the Malayan Peninsula”), Cheel (in Ewart & Davies’s “Flora of the Northern Territory”), and others” (C. T. White, Proc. Roy. Soc. Qd 34: 47 (1922)).

“ . . . until the types can be studied, critical work on this difficult group is impossible.” (C. T. White, J. Arnold Arb. 23: 89 (1942)).

“ . . . the polymorphic *Melaleuca leucadendron* is represented by at least six forms in Western Papua; two of them swamp trees, the others inhabitants of dry savannah” (Brass, J. Arnold Arb. 19: 179–80 (1938)).

In the half century following the publication of *Flora Australiensis*, most botanists were content to follow Bentham’s treatment though F. M. Bailey (Syn. Qd Fl. 170–1 (1883) and Qd Fl. 2: 600–1 (1900)) distinguished “three well marked varieties” in Queensland, W. V. Fitzgerald (Western Mail, Perth, 2nd and 16th June 1906, and J. Roy. Soc. W. Aust. 3: 186–7 (1918)) described two new species from Western Australia, and Baker & Smith and Baker in Proc. Linn. Soc. N.S.W. 38: 597–602 (1914), J. & Proc. Roy. Soc. N.S.W. 47: 198–200 (1914) recognized eleven species in the group, two of them described as new, without attempting to show how these differed from one another.

In 1917, Cheel presented a classification of the Australian forms based on differences in the indumentum of the axis of the inflorescence, leaf-shape and flower-colour, treating them as varieties of *M. leucadendron* as quoted above, and providing a key. He tried to identify many of the names that had been proposed up to that time but several of his identifications are wrong, and it became more and more evident that much herbarium material could not be sorted according to this treatment. Since 1917 names have been proposed by Gandoger, Domin and Guillaumin without reference to Cheel’s work.

C. T. White, with his extensive field knowledge of the group in Queensland, New Guinea and New Caledonia, was convinced that several species were present, but was not able to find tangible distinguishing characters. In 1939 he compared many specimens in the Queensland Herbarium with the material at Kew and his notes have been of great help in the present study.

In 1950, I examined the flowers in more detail than previously and noticed differences in the structure of the sepals and form of the hairs in the indumentum that appeared to be correlated with differences in facies. Queensland botanists have always held the opinion that only one taxon is found in the neighbourhood of Brisbane, where it is locally abundant; it was thought therefore that a study of the variation on and between trees in this area would give a clue to the kind

and degree of variation that might be expected within related taxa. My ideas on most of the taxa had taken shape by 1954, since when I had further opportunities to examine in the field over a large area all of the ten species especially concerned.

Over ninety names had to be considered in studying the nomenclature of these species; seven are not validly published and about twenty-five belong to species less closely related to *M. leucadendron*. About a third of all names were based on other names because of homonymy or change of taxonomic rank. Four names were based on Rumphius's figures, two are horticultural names, and the others are based on specimens. Types or isotypes or photographs of these have been seen of nearly all names; in a few cases the application of names had to be derived from original descriptions and figures, and specimens from the type locality.\* Several names have been misapplied. Although so many names have been published, a new combination had to be made since this study began and three species had to be described as new. A list of all names in alphabetical order with the correct name of the species to which each belongs is given at the end of this paper.

This paper is the result of about thirty years' active acquaintance in the field with most of the species over the greater part of their known range in Australia, the experience of my predecessors, especially the late C. T. White, and the study of herbarium specimens representing about 700 separate collections. The material in the Queensland Herbarium, Brisbane (BRI)† provided an excellent basis, and through the courtesy of the directors of the herbaria concerned, I have been able to examine on loan the material in the National Herbarium of New South Wales (NSW), which includes the material studied by Cheel and types or isotypes of Gaertner, J. E. Smith, R. T. Baker, and W. V. Fitzgerald, the National Herbarium of Victoria, Melbourne (MEL), which includes all the material studied by Mueller and much of that studied by Bentham, including some type material, Technological Museum (now Museum of Applied Arts and Sciences), Sydney, which includes material studied by R. T. Baker, State Herbarium of Western Australia, Perth (PERTH), which includes isotypes of W. V. Fitzgerald, State Herbarium of South Australia (AD), herbaria of the Missouri Botanic Garden (MO), which includes isotypes of Schauer and Turczaninow, Arnold Arboretum (A), Bailey Hortorium (BH), Waite Agricultural Research Institute (ADW), Department of Forests, Papua and New Guinea (LAE), Herbarium Australiense, Canberra (CANB), a series from the Rijksherbarium, Leiden (L) selected by Dr. C. G. G. J. van Steenis, including the types of Blume and Miquel, the types of Brongniart and Gris and of Guillaumin in the Museum National d'Histoire Naturelle, Paris (P) and of

---

\* Of validly published names not of horticultural origin, holotypes or isotypes have now been seen of all but three. The holotype of one of these is known to have been lost, and the other names were probably based on the same collection.

† Symbols for Herbaria (Herbarium Abbreviations) are those in Index Herbariorum (Regnum Vegetabile vol. 31) 1964.

Gandoger in the Herbarium of the University of Lyons (LY), and photos of types and isotypes in the Linnaean Herbarium (LINN), British Museum (Natural History) (BM), Botanical Institute of the Academy of Sciences of the Ukrainian S.S.R., Kiev (KW), De Candolle Herbarium (G-DC) in the Conservatoire et Jardin botanique, Geneva (G), and the Herbarium of the University of Florence (FI). One type of Cavanilles could not be found at the Instituto Botánico "Antonio José Cavanilles", Madrid (MA). Dr. Austin Griffiths Jr., Los Angeles State and County Arboretum, sent a fine series of specimens from plants cultivated in California. For copies of descriptions in works not available in Brisbane I am indebted to Dr. C. G. G. J. van Steenis, the Directors of the Royal Botanic Gardens, Kew, and the National Herbaria of New South Wales and Victoria, Prof. A. Guillaumin, Paris, Prof. H. St. John, University of Hawaii, and the Melbourne Public Library. Dr. W. T. Stearn (BM), Dr. F. A. Stafleu (Utrecht) and Dr. H. W. Rickett (New York Botanic Garden) have helped with bibliographical problems. For notes on Salisbury's "Prodromus" I am indebted to Dr. M. Tindale, Sydney, while she was Australian Liaison Officer at Kew. Prof. R. L. Specht (University of Queensland) lent the negative for Fig. 14 B.

A microfilm copy of R. Brown's MSS. in the British Museum (Natural History) is at Brisbane (BRI).

The keys have been tested by my colleagues and the staff of the Rain-forest Ecology Section, C.S.I.R.O., Brisbane.

After the typescript of the paper was finished I visited the herbaria at the British Museum, Cambridge (CGE), Copenhagen (C), Edinburgh (E), Florence, Geneva (G and G-DC), Kew, Leiden, Munich (M), Paris, Stockholm (S), Uppsala (UPS), Vienna (W) and Zürich (Z). I saw specimens previously known only from photographs and important additions were made to the range and citation of specimens of *M. leucadendron* and *M. cajuputi*. A few other modifications were found necessary but otherwise the text is as it stood at the end of 1964.

## II. GENERAL TAXONOMY AND DISTRIBUTION

The genus *Melaleuca*, based on *M. leucadendron*, is distinguished from other genera of Myrtaceae-Leptospermoideae by the stamens united into 5 distinct bundles, each opposite a petal and longer than it, with versatile anthers, and a 3-celled ovary with several to many more or less ascending to erect ovules in each cell. The name *Melaleuca* L. Mant. 1: 14 (1767) is conserved against *Kajuputi* Adans. Fam. 2: 84 (1763). *Myrtroleucodendron* Burm. in Rumphius, Herb. Amboin. 2: 77 (1750) ("*Myrto-Leucodendron*"), taken up by O. Kuntze, Rev. Gen. Pl. 1: 241-2 (1891) is an invalid name, having been published before 1753. *M. leucadendron* belongs in Bentham's Series *Spiciflorae* distinguished

by the flowers borne in spikes, the axis of which grows out into a leafy shoot before the flowering is over. *M. leucadendron* and its immediate allies have the following characters in common:—

Trees, sometimes dwarf or shrubby, with externally whitish, internally often brownish, many-layered papery bark. Shoot-buds ovoid to narrow ovoid; scales numerous, many-nerved. Leaves mostly 5–10 on each shoot, alternate, spirally arranged, flat (widest at or near the middle in most species), often vertical, often curved at the base or pendulous with  $\pm$  twisted petioles, usually 5- sometimes 3- or 7-nerved on the same specimen, sometimes with additional longitudinal veins uniting with others above the middle, with the secondary veins tending to be longitudinal, mostly above 3 cm long. Spikes terminal or also in the upper axils, many-flowered, at least 1.5 cm wide; most flowers ternate or binate on the axis but neither whorled nor opposite. Calyx-tube subcylindrical, usually slightly widened upwards, from a little shorter to a little longer than wide; sepals semicircular to  $\pm$  deltoid, from half as long to nearly as long as the calyx-tube, ciliolate, sometimes minutely so, erect or slightly spreading. Petals very thin with subcircular deeply concave, spreading lamina, and a short to very short broad suberect claw, finely veined, glandular, usually ciliolate. Staminal bundles with 3–9 rarely 10 filaments irregularly united to a short claw which is in most species always shorter than the petals, rarely longer but not more than 2.5 mm long, glabrous. Style from somewhat shorter to somewhat taller than the stamens, slender, glabrous, with a small  $\pm$  capitate or subpeltate stigma; ovules very many on a peltate placenta. Fruit as wide as or wider than long, the valves of the capsule somewhat exserted, especially if not quite mature, to shortly included; seeds very many.

The following parts were studied in the search for diagnostic characters:—

*Bark*.—The bark consists of a large number of compacted, thin, whitish or brownish paper-like layers of cork separated by thin fibrous layers, and is very similar in all species. The surface is commonly partly blackened by fire. In small trees (4–7 m high) the surface is commonly fairly even and the bark apparently hard, but very frequently and especially on larger trees (up to 30 m high) the outer layers are looser and become torn and ragged and partly outrolled.

*Twigs*.—The twigs vary from short, stout and spreading to long, slender and drooping, the differences giving a fairly distinctive appearance to the crown. There is a definite trend in each species towards one extreme or the other although occasional trees of a species show wide variation from the general trend. Also the taller the tree becomes the greater is the tendency for the twigs to elongate.

*Indumentum*.—On the whole, the presence or absence of indumentum is fairly constant within a species. Its nature is a useful diagnostic character. The hairs may be short or long, spreading or appressed, straight or flexuose; three species have very short, erect, crisped hairs as well (see fig. 15 N). The indumentum usually disappears from the older leaves except near the base and on the petiole.

*Bud-scales*.—These are firm and numerous, the lower ones  $\pm$  ovate and closely striate, the upper ones becoming more or less oblong, often with thinner nerveless margins. The margins are usually ciliate or ciliolate, but the greater part

may be hairy or glabrous in the same species. The shape, size and nervation of the bud-scales are among the characteristic features of the group, but they appear to offer no diagnostic characters for the species.

*Young shoots*.—The indumentum of the young shoots after the bud-scales have fallen and before the leaves have fully developed is characteristic for some species.

*Leaves*.—The number of leaves on each shoot varies between 4 and 11 and helps to distinguish the group from other groups of species, but the number is not diagnostic for any species. The leaf-index (ratio of length to breadth) varies within fairly definite though sometimes wide limits for each species and tends to increase on the taller trees; associated with this increase in leaf-index is a tendency for the blade to curve at the base or even become truly falcate, and the petiole to lengthen. Leaves with a low index are usually spreading and horizontal, those with a high index tend to become vertical and pendulous. The blade in most is widest about the middle, distinctly below only in *M. leucadendron* itself. It is frequently more abruptly narrowed to the apex than to the base, giving an obovate or oblanceolate impression even when widest actually at the middle. The usual number of longitudinal veins is 5, excluding the nerve-like margins, rarely 7 and still more rarely reduced to 3 in very narrow leaves; in very broad leaves secondary longitudinal veins may be found but these run into the primary veins well below the apex. The width of the veins varies within narrow limits and provides a useful diagnostic character. The venation of higher order is irregularly reticulate, the reticulations elongated in the direction of the leaf. Oil dots are nearly always conspicuous in some species, sometimes hard to find in others especially in those where the full-grown leaf is very thick. The nature of the oil has been thoroughly examined in two species only, but a distinct variation in the composition has been noted in one of them.

*Inflorescence*.—The spikes are terminal, solitary or up to 4 together, often with additional spikes in the upper axils. The tendency to produce axillary spikes is more marked in some species than in others; the leaves often fall before the spikes are fully developed so that an apparent raceme of spikes is found, giving a characteristic facies. The length of the spike varies a good deal in each species and does not provide a diagnostic character, but its width and the thickness of the axis vary within well-defined limits characteristic for some species. The distance between the triads of flowers varies, some species tending to have dense spikes, others loose ones. The indumentum of the axis is a characteristic feature of some of the species but is occasionally absent or nearly so in individuals of species with a usually hairy axis; the indumentum tends to disappear after flowering but traces can usually be found in fruiting spikes around the base of the fruits.

*Flowers*.—The length of the flowers varies within definite limits, and this and consequently the width of the spike varies sufficiently from species to species to provide a useful diagnostic character. They vary greatly in colour, which is usually determined by the colour of the filaments. The prevailing colour is from pale green through cream to white, and varies during the life of each flower. Red or crimson flowers are to be found in three species; trees producing such colours

must be rare in one species but are fairly common in two. In some, cream or greenish flowers wither reddish. Red-flowered trees usually occur sporadically and there is enough evidence to show that they need not breed true. The red colour would appear to be a recessive character, possibly not due to a single factor because various shades have been observed and reported in the same community. In the absence of controlled breeding experiments any suggested explanation of the distribution of red flower-colour must be merely hypothesis.

*Calyx*.—The calyx-tube varies considerably in size within and between species. The outside usually has indumentum like that of the rhachis; the inner part above the ovary is glabrous or pubescent, the presence or absence of hairs being constant in most species. The sepals are mostly more or less semicircular, rarely  $\pm$  triangular and somewhat longer; the edges are nearly always  $\pm$  distinctly ciliolate. An important variation is in the texture, in which there are two strong trends. In some species the sepals are herbaceous or coriaceous nearly throughout with  $\pm$  distinct nerves and glands; in others only the middle lower part is herbaceous and this passes rather abruptly into a relatively broad, thin,  $\pm$  hyaline or scarious margin 0.3–0.5 mm wide which is always glabrous except for the ciliolate edge. In the former the sepals are pubescent or tomentose over all or nearly all the back, except for the occasional glabrescent states previously mentioned; in the latter the indumentum, if any, is restricted to the thicker part (fig. 15, As–Hs). The inside of the sepal is glabrous or pubescent, but the pubescence is independent of that on the outside and is restricted to the thick part.

*Petals*.—The petals vary in size and colour, the colour usually resembling that of the stamens. The deeply concave lamina set at an angle to the short broad claw makes precise measurements difficult or impracticable and only approximate figures have been given in this paper; however it is evident that size alone has no significant diagnostic importance; the lamina has mostly a ciliolate margin and is occasionally also pubescent, but the development of pubescence is quite variable and seems to have no diagnostic value. The shape of the glands on the lamina is, however, fairly constant, circular to elliptic in some species, mostly linear in others.

*Stamens*.—The number of stamens in each bundle varies within definite limits characteristic for each species and provides a useful diagnostic character, and the same applies to the length of the bundle. The number of stamens often varies from bundle to bundle in the same flower, and a single flower may show as much variation as the whole species; I have described the number in the bundle in preference to the whole flower as it is easier to determine. The length of the claw is too indefinite and variable to be made use of. The filaments in each bundle vary in length, the lateral ones being the shortest. The length of the anthers is a useful character. Whether the bundles fall separately or with their bases united in a ring seems entirely fortuitous.

*Pistil*.—The pistil has provided no diagnostic features. The height of the style relative to the stamens depends at least in part on the age of the flower.



*Fruits*.—In most species the fruits remain attached to the plant for years, and become larger with age; there is some variation in size between the species, but not much in form.

*Habit*.—The very considerable variation in height in some species is at least partly correlated with the availability of ground water. The differences in habit are related to prevailing size, shape and posture of the leaf and length and stiffness of the smaller branches. The characteristic appearance of some species tends to disappear from the taller trees because of their tendency to produce long-petiolate,  $\pm$  pendulous and vertical, narrow falcate leaves and longer twigs—there is a definite convergence towards a similarity in leaf-form associated with increasing height of the tree. The difference in appearance between the extremes is often striking, especially in *M. viridiflora* (figs. 4, 14 D, 14 DD).

*Seedlings*.—One crop of seedlings of each of six species has been examined, two of them collected in the field under the parents. All are hairy in the younger stages, but those of *M. leucadendron* soon become glabrous. The cotyledons are opposite and leaf-like and are followed by one or more usually two pairs of opposite leaves. All leaves seen are narrow, long attenuate to the base and nearly sessile; the early ones are 3-nerved and loosely and irregularly pinnately veined resembling the adult leaves of *Callistemon* more than those of their own species. The leaves of *M. nervosa* and *M. saligna* are conspicuously narrower than the others and retain the 3-nerved state to at least the 13th leaf in *M. saligna* and about the 60th leaf in *M. nervosa*. The leaves of *M. leucadendron*, *M. quinquenervia* and *M. viridiflora* do not differ much in shape, but five nerves begin to appear in about the 7th leaf of *M. leucadendron*, about the 12th leaf of *M. quinquenervia* and about the 20th leaf of *M. cajuputi*; of *M. viridiflora* the 13th leaf is still 3-nerved but no older plants were preserved. A very few seedlings of *M. arcana* were also raised, but nothing from the youngest stages was preserved; 5-nerved leaves occur below the first branch.

*Distribution*.—All species are found in localities with abundant ground water, and most of them in areas with a pronounced dry season. All are widely distributed and locally abundant with a tendency to form pure communities. Such communities are a conspicuous feature of the vegetation of northern and north-eastern Australia, New Caledonia, southern New Guinea, the Moluccas and some other parts of Malaysia. *M. argentea* is restricted to sandy stream banks subject to periodic flooding; *M. leucadendron* forms fringing forests above the beds of larger streams, usually with *M. argentea* on a higher terrace, but occasionally forms forests on old dunes near the coast or in swamps; in New Guinea and Amboina it occasionally at least forms forests in other situations. The other species are usually absent from the larger streams at least and tend to form pure stands on ground with a high water-table and impeded drainage. Tall swamp-forests are widely spread. Some species extend to arid regions. Species rarely mix but two or more may occupy contiguous areas. Two or more species may be found in flower at the same time but flowering seasons are inconstant and some trees of some species may flower twice a year. The flowers are rich in nectar and are much sought after

by bees and other insects and honey-eating birds. Opportunities for cross-pollination certainly occur and occasionally trees of apparent hybrid origin have been noted; a few herbarium specimens may be of hybrid origin.

Apart from the correlation between leaf-shape, height and ground water, no correlation has been observed between the variation in any character and environment or geographical distribution. The greatest concentration of species is in northern Queensland (where all species have been found) with a gradual disappearance to the south, one species only having been found south of lat. 25° 30' S., this also being in New Caledonia. In Malaysia only one has been found west of Ambon and Obi, extending to Burma and Indo-China.

The taxa are accepted as species for the following reasons:—

- (1) Each differs from the others by a combination of characters of flower, young shoot and adult leaf.
- (2) These differences are comparable with those between other allied species in the genus.
- (3) Each taxon occupies an extensive area of distribution, commonly occurring as pure communities within that area.
- (4) Hybridism appears to be rare although there appears to be ample opportunity for it to take place.

### III. ECONOMICS

Because of the long-standing tendency to treat all forms as *M. leucadendron* and the confusion in taxonomy and nomenclature following more recent attempts at distinguishing other taxa, it is not possible to assess the economic value of the separate species. Except where otherwise stated the following remarks apply chiefly to *M. leucadendron* and *M. quinquenervia*. Tall trees have been cut for timber and smaller ones used for posts and rails for fencing.

The timber is tough, moderately hard, and relatively short-grained and has a tendency to warp that makes it somewhat difficult to season. It is one of the best for naturally bent knees for boatbuilding and has been used for oyster stakes. It has been used for framework in building and when well seasoned and dressed it makes excellent flooring, but it is not durable when exposed to the weather unless very well drained (Swain, *Timbers and Forest Products Qd*: 175–8 (1928); Watson, *Qd For. Serv. Pamphlet 1*: 12, 20, 24, 29 (1951)). Logs, at least of *M. quinquenervia*, offer considerable resistance to the attacks of marine Teredinidae but are attacked by *Nausitora* in river waters of lower salinity (Watson *et al.*, *Qd For. Serv. Bull.* 12: 59 (1936)); the logs are usually too short for piles but are used for fenders. In Malaya the timber of *M. cajuputi* is said to be durable in contact with fresh or salt water and is used for firewood (Corner, *Wayside Trees of Malaya* 506 (1940)). The timber of *M. argentea* has been used for general building in Gladstone, Queensland; it is easily worked and dresses well (Rondlund on label to QFD. 62/339).

Cajeput oil has been distilled from the leaves of *M. cajuputi* for centuries for medicinal purposes; a very similar oil has been obtained from *M. quinquenervia* and has been exported from New Caledonia under the name of Niaouli Oil. The

principal constituent is cineole, the others being chiefly terpineol and its esters and pinene with a small proportion of benzaldehyde. The oils are used for coughs and colds, and externally for neuralgia and rheumatism; they have been successfully employed as flavouring agents in confectionery. Cajeput oil is also reputed to be of value as an insect repellent and as an anthelmintic, being particularly efficacious for the treatment of roundworm. The cineole content is not as high as in eucalyptus oils and the yield of oil is lower than in *Eucalyptus* spp. (Morrison, S. Pacific Com. Quart. Bull. Jan. 1958: 47, and Hellyer & McKern, J. & Proc. Roy. Soc. N.S.W. 89: 188–193 (1956) with bibliography). The bark has been used for roofing, caulking ships (Rumphius), and for lining baskets etc., in horticulture. According to Morrison op. cit. p. 49 the barks of some paper-bark tea-trees (which would include *M. quinquenervia*) have been used in New South Wales as an upholstery filling claimed to be proof against moths and vermin; babies' pillows filled with treated bark are said to be "non-suffocating"; and it has been recommended as an insulating material.

The flowers are rich in nectar and pollen and at least some species are valuable sources of these to beekeepers though the honey is not of first grade; *M. quinquenervia*, *M. viridiflora* and *M. dealbata* are the best known in this connection (Blake & Roff, Honey Fl. S.E. Qd: 110 (1959)), but Leichhardt mentioned that they washed with water the flowers of what must have been *M. leucadendron*, possibly also *M. argentea*, to collect the nectar.

*M. cajuputi* has been widely planted in Malaya. *M. quinquenervia* is grown as an ornamental tree, more especially in California and Florida; it is partly naturalized in the latter.

In communities dominated by *Melaleuca* there is often a rich herbaceous vegetation of grasses, Cyperaceae and other plants, many of them annuals, while, especially within the tropics, there are often characteristic epiphytes in the wetter regions, especially species of *Dischidia* and *Myrmecodia*, and *Dendrobium canaliculatum*. The ground vegetation affords forage for cattle of usually poor quality. Some of the swampy forests have become rich sugar farms.

#### IV. TERMINOLOGY OF SHAPES

For the terminology of flat shapes an attempt has been made to follow the scheme in Taxon 11: 145–156 (1962) with the exception that the terms lanceolate and oblanceolate have been retained for shapes of the ovate plan about 3 times as long as wide in conformity with the usage by A. T. Lee in Contrib. N.S.W. Herb. 1: 144 (1948) and W. T. Stearn in Roy. Hort. Soc. Lond. Dict. Gard. suppl. 320–1 (1956). It has been possible to avoid conflict between the two schemes in other cases but the later one admits far too wide a range for the terms ovate and narrowly ovate to allow critical description of the shape of the leaves in *Melaleuca*. However, because the leaf index is a useful diagnostic character, its range has been given in every case and no risk of misunderstanding should arise.

## V. BIBLIOGRAPHICAL REFERENCES, CITATION OF SPECIMENS, ILLUSTRATIONS AND MAPS

Bibliographical references have for the most part been restricted to the places of original description. Nearly all references to *M. leucadendron* rightly belong to other species, those to plants west and north of Ambon belonging to *M. cajuputi*, those in New Guinea chiefly to *M. viridiflora*, those in New Caledonia, New South Wales and south Queensland to *M. quinquenervia* and those in central and north Queensland, Northern Territory and Western Australia, chiefly to *M. viridiflora*, *M. leucadendron* or *M. nervosa*.

All references and specimens cited have been examined except the few indicated "not seen". All specimens examined in flower or fruit have been cited, partly for plant geographical reasons; from no herbarium can an adequate idea of the distribution of any species be derived and it is likely that no species is fully represented by the localities cited here; considerations of space led to the omission of collectors' notes and the day of month of collection, though altitudes are given when recorded and habitats given in protologues. Indication (by the usual symbols) of herbaria in which specimens are deposited is restricted to types and a few other critical specimens.

Localities are arranged in a general west-east, north-south direction. Localities in Malesia are grouped according to the system proposed by van Steenis in Fl. Males. ser. I, 1: LXXVI–LXXVIII and map 1 (1950); in Queensland they are grouped in Pastoral Districts, Burke District (west) preceding Cook District (north) in the case of species with a wide distribution in northern Australia and Cook District taking precedence in the case of species with a predominantly eastern distribution; localities in the Northern Territory are also grouped in Pastoral Districts; localities in New South Wales are arranged in the Divisions proposed by Anderson, Trees of N.S.W., 1–2 and map (1947); Western Australian localities belong almost exclusively to the Northern Province of Gardner, J. Roy. Soc. W. Aust. 28: lxxxv (1942). Pastoral holdings (cattle stations, sheep stations) are often treated in Australia as localities comparable to towns and are similarly marked on some maps; in this paper such names are cited between double quotes or the name is followed by the abbreviation Stn. (Hughenden for the town, "Hughenden" or Hughenden Stn. for the sheep station). Details not given on labels but derived from other sources are included within square brackets.

The illustrations were designed to show differences between the species as far as the limits of the page allow and were prepared from representative specimens without regard to any nomenclatural significance of these. Figs. 1–13 are from photographs of herbarium specimens by Mr. G. E. Cripps, Photographer, Department of Primary Industries, Brisbane. The distribution maps have been grouped to show different patterns of distribution met with; they are based on all specimens seen.

## VI. THE SPECIES

As mentioned above, some of the names that have been associated with *Melaleuca leucadendron* correctly belong to species that are not very closely allied to it. It is expedient to discuss these species, but in so doing it is necessary to deal with other species again because of further confusions and misapplication of names. These have not been given equal treatment in this paper; some have been studied as intensively as *M. leucadendron* but of others much less material was examined and detailed distributions are not given.

## KEY TO SPECIES

Four keys are presented. The first distinguishes the species dealt with in this paper from the remainder of the genus and then separates those dealt with in Keys nos. 2 and 3. Key no. 2 distinguishes *M. leucadendron* and the species most closely allied to or associated with it. Key no. 3 deals with the other species and Key no. 4 treats the same species as no. 2, using vegetative characters alone. The last is not as critical as Key no. 2 but since the group as a whole is usually readily recognizable it may be useful in the field.

## KEY No. 1

Inflorescences spiciform to subcapitate, long or short, lax or dense, terminal or also in the upper axils, the axis growing out often before flowering is over. Flowers all bisexual (all male on some specimens of *M. lanceolata*) 1-3 together, those in pairs or triads on one side of the axis, not opposite or equidistant, the groups spirally arranged. Stamens 3-30 in each bundle, the bundle not less than 5 mm long with a claw not exceeding 4 mm (up to 5 mm when the bundles are 20 mm or more long). Ovules numerous. Leaves flat, large or small, broad or narrow but at least 5 mm long and 1 mm wide, spirally arranged, 1-5-nerved or if with more nerves then more than 1 cm long and wide.

Flowers in triads or very densely packed, the flowering spike at least 1.5 cm wide with glabrous stamens in bundles of 3-10 and glabrous styles. Leaves commonly 5- rarely 3- or 7-nerved, at least 1.5 cm long and 3 mm wide, usually 5-15 on each twig. *M. leucadendron* and species most closely allied thereto KEY 2

Flowers solitary or when paired or in triads the spike not wider than 2 cm. Filaments in bundles of 8-30, sometimes hairy. Style sometimes hairy. Leaves mostly 1-3 nerved, if with more than 3 nerves then less than 3 mm wide, commonly at least 15, usually 20-60 on each twig. Species less closely allied to above KEY 3

Inflorescence various, spicate, capitate or of very few or even single flowers, sometimes terminal with the axis growing out or not and then sometimes male with bisexual flowers in spikes towards the base of the shoot. Leaves and flowers sometimes opposite, the former sometimes terete or nearly so, sometimes when flat very narrow up to 2 mm wide but 10-20 times as long as wide, the latter sometimes with stamens very many in each bundle or on a long claw; ovules sometimes few EXCLUDED SPECIES

**KEY 2. SPECIES OF THE GROUP INCLUDING *MELALEUCA LEUCADENDRON***

Inflorescence at least 2 cm wide; fruit at least 3 mm long and wide; leaves commonly 1 cm or more wide or else with petioles up to 10 mm long or longer. (Sepals less than two-thirds as long as the calyx-tube, broader than long,  $\pm$  semicircular):

Sepals with the greater part consisting of a broad glabrous membranous or subhyaline or subscarious marginal band 0.25–0.5 mm wide; remainder much thicker and glandular and with the calyx-tube glabrous or hairy outside; young shoots and axis of inflorescence glabrous or hairy; indumentum, when present, of straight or nearly straight, spreading or appressed silky hairs:

Leaves 9–14 times as long as wide, usually widest distinctly below the middle, distinctly falcate, acute or acuminate, very soon glabrous; calyx and axis of inflorescence glabrous; petals with small elliptic but no linear glands 1. *M. leucadendron*

Leaves up to 7 times as long as wide, widest at about the middle, straight or  $\pm$  falcate, acute or obtuse, the indumentum tending to persist at least on the petioles; axis of inflorescence commonly hairy; calyx glabrous or hairy; petals with long linear glands as well as small elliptic ones:

Inflorescences 2–2.5 cm wide with the axis 1–1.3 mm thick; leaves with principal veins 0.3 mm wide; calyx-tube (1.2–1.9) x (1.5–2) mm, the sepals 0.7–0.9 mm long; anthers 0.4–0.55 mm long; fruit (3–3.5) x (3.5–4) mm (indumentum of  $\pm$  spreading hairs) 2. *M. cajuputi*

Inflorescences 2.5–6 cm wide with the axis usually 1.3–2.5 mm thick; leaves with the principal veins 0.3–0.5 mm wide; calyx-tube (2–3.5) x (2–3) mm, the sepals 1–2 mm long; anthers 0.6–1.2 mm long; fruit (3–4.5) x (4.5–5) mm; indumentum appressed or  $\pm$  spreading, sometimes inconspicuous; leaves thicker and stiffer than in *M. cajuputi*, the dots often inconspicuous:

Petioles 4–10 mm long, 1.5–2.4 mm wide; blades mostly 5-nerved; inflorescence 2.5–3.5 cm wide, the axis 1.1–1.8 mm thick, the hairs  $\pm$  spreading upwards; calyx-tube 2–2.5 mm long

3. *M. quinquenervia*

Petioles mostly 10–20 mm long, 2–5 mm wide (sometimes as short as 5 mm long and only 1.8 mm wide); blades 5–7-nerved; inflorescence 3.3–6 cm wide, the axis 1.5–2.5 mm thick, hairs appressed, rarely absent; calyx-tube 2.5–3.5 cm long

4. *M. viridiflora*

Sepals nearly or quite equally thick and densely tomentose almost to the margin; young shoots, calyx-tube and axis of inflorescence tomentose; indumentum of persistent minute curved or crisped hairs usually mixed with less persistent longer straight hairs:

Inflorescence less than 2.5 cm wide; leaves mostly 7–12 cm long, 1.5–2.5 cm wide, about 4–8 times as long as wide, with the indumentum of short crisped hairs usually long persistent giving a hoary appearance to the foliage, any longer hairs chiefly marginal and soon wearing away

5. *M. dealbata*

Inflorescence 3–5 cm wide; leaves shorter or narrower or with a different leaf index, the indumentum with many long appressed or spreading hairs, these sometimes soon disappearing:

Leaves 2–6.3 times as long as wide, usually more abruptly narrowed to the top than to the base; stamens 3–5 in each bundle; twigs stout

6. *M. nervosa*

Leaves 6.5–13 times as long as wide, about equally narrowed to top and base; stamens 5–7 in each bundle; twigs very slender

7. *M. argentea*

Inflorescence 1.5–2 cm wide; fruit mostly less than 3 mm long or wide; leaves frequently less than 1 cm wide, the petioles up to 8 mm long or very short; sepals sometimes up to two-thirds as long as calyx-tube:

Triads of flowers distant in a  $\pm$  elongated spike; sepals triangular, two-thirds as long as calyx-tube with a narrow membranous margin (0.1–0.15 mm wide); (leaves 6–12 times as long as wide) 8. *M. stenostachya*

Triads of flowers densely aggregated in often very short spikes wider than long; sepals with broad membranous margins 0.2–0.25 mm wide:

Leaves 5–10 times as long as wide; calyx pubescent; sepals nearly semicircular, about half as long as the calyx-tube 9. *M. saligna*

Leaves 2–5.5 times as long as wide; petioles sometimes very short; calyx glabrous except for a tuft of hairs at the base and between the  $\pm$  triangular sepals these about two-thirds as long as the tube 10. *M. arcana*

### KEY 3. SPECIES NOT SO CLOSELY ALLIED TO *M. LEUCADENDRON*

Flowers solitary along the axis, often well separated from one another; sepals  $\pm$  semicircular:

Flowering spike 2.5–3.5 cm wide; stamens in bundles of 13–26, some of the filaments on the upper face of the claw; leaves at least 1.5 cm long and 4 mm wide:

Calyx densely hairy outside; leaves about 2.5–4 times as long as wide; fruit distinctly longer than wide 11. *M. deanei*

Calyx glabrous outside; leaves 5–11 times as long as wide; fruit shorter to a little longer than wide 12. *M. groveana*

Flowering spike not more than 2 cm wide; stamens in bundles of 8–14; none of the filaments on the upper surface of the claw; leaves up to 1 cm long and 2 mm wide 13. *M. sieberi*

Flowers mostly 2–3-nate; stamens and/or style hairy or glabrous (spike not more than 2 cm wide); sepals triangular,  $\pm$  acute, stiff:

Style and stamens glabrous:

Leaves petiolate, narrowed to base, 1–3-nerved; sepals 1-nerved:

Leaves with mostly curved edges, very acute; petioles rarely as long as the width of the blade; staminal claw shorter than the petals; filaments 8–14; rough bark 14. *M. lanceolata*

Leaves with mostly parallel sides, callous at tip; petioles about as long as the width of the leaf; staminal claw longer than the petals; filaments 15 or more; paper-bark 15. *M. preissiana*

Leaves sessile with broad base, up to 5-nerved; sepals 3–5-nerved; rough bark 16. *M. bracteata*

Style or also the stamens hairy:

Stamens glabrous, 20–30 in each bundle; leaves 8–16 mm long, 1.3–2 mm wide 17. *M. decora*

Stamens hairy, 8–19 in each bundle; leaves 12–45 mm long, 2–7 mm wide 18. *M. lasiandra*



**KEY 4. KEY TO THE SPECIES OF THE GROUP INCLUDING MELALEUCA  
LEUCADENDRON BASED ON FOLIAGE**

Leaves 5–14 times as long as wide:

Leaves widest mostly well below the middle, glabrous *M. leucadendron*

Leaves widest at about the middle,  $\pm$  silky when young:

Leaves not dotted; petiole 2–8 mm long (fruits in short dense spikes)

*M. saligna*

Leaves dotted; petioles 2–4 or 4–10 mm long (fruits in long,  $\pm$  loose spikes):

Petioles 4–10 mm long,  $\pm$  curved; blades oblique to falcate; minute crisped hairs present as well as silky ones *M. argentea*

Petioles 2–4 mm long, straight; blades mostly straight; no minute crisped hairs *M. stenostachya*

Leaves 2–7 times as long as wide:

Leaves mostly hoary with a close tomentum of minute crisped hairs *M. dealbata*

Leaves silky-hairy or glabrous or only the petioles sometimes with the lower part of the blade  $\pm$  mealy:

Leaves 2.5 cm wide or wider, rarely narrower, very thick; petioles 1–2 cm long, up to 5 mm wide; young shoots with appressed silky hairs *M. viridiflora*

Leaves mostly less than 2.5 cm wide, not conspicuously thick; petioles up to 11 mm long, up to 2.5 mm wide; young shoots with at least some spreading hairs:

Leaves about equally narrowed to base and apex; bud-scales without minute crisped hairs; hairs on young shoots mostly about 1 mm long:

Petioles less than 4 mm long; blades up to 5 cm long *M. arcana*

Petioles 4–11 mm long; blades mostly more than 5 cm long:

Old leaves closely dotted, rather thin in texture; reticulations about as prominent as main veins *M. cajuputi*

Old leaves not conspicuously dotted, not thin-textured; reticulations  $\pm$  obscure *M. quinquenervia*

Leaves usually more abruptly narrowed (more rounded) to the apex than to the base, though still widest about the middle; bud-scales with some minute crisped hairs besides longer straight or nearly straight ones; longer hairs on the young shoots mostly 0.5 mm long or less *M. nervosa*

**1. *Melaleuca leucadendron* (L.) L. Mant. 1: 105 (1767). Based on *Myrtus leucadendron*.**

*Arbor alba* Rumph. Herb. Amboin. 2: 72, t. 16 (1750). Types: Figure and description of plant from Amboina.

*Myrtus Leucadendra*, *baccis sessilibus urceolatis, foliis lanceolatis* L. in Stickman, Herb. Amboin. 9 (1754). Based on "Arbor alba. Rumph. [Herb.] Amb [oin]. 2. p. 72, t. 16-17".

*Myrtus leucadendron* L. (Amoen. Acad. 4: 120 (1759)), Sp. Pl. ed. 2: 676 (1762) ("*Leucadendra*"). Based on "Arbor alba. Rumph. [Herb.] Amb [oin] 2. p. 72, t. 16-17"; lectotype, by exclusion, p. 72, t. 16.

*Leptospermum leucadendron* (L.) J. R. & G. Forst. Char. Gen. 72 (1776). Based on *Melaleuca leucadendron*.

*Melaleuca leucadendron* (L.) *a latifolia* L. f. Suppl. Pl. 342 (1781). Based on *Myrtus leucadendra*.

*Melaleuca mimosoides* A. Cunn. ex Schau. in Walp. Repert. Bot. Syst. 2: 927 (1843). Type: Rockingham Bay and Endeavour R., Qd, Cunningham 253/1819; holotype not located; isotypes K, BM, photo BRI.

*Melaleuca leucadendron* (L.) L. var. *mimosoides* (A. Cunn. ex Schau.) Cheel in Ewart & Davies, Fl. North. Territ. 295 (1917). Based on *Melaleuca mimosoides*.

*Melaleuca amboinensis* Gandoger, Bull. Soc. Bot. France 65: 26 (1918), syn. nov. Type: Amboina, *de Vriese* (LY, photo BRI).

*Cajuputi leucadendra* (L.) Rusby, U.S. Dept. Agric. Bur. Pl. Int. Bull. 248:42 (1912) (as "(Stickman) Rusby"). Based on *Myrtus leucadendra*.

? *Melaleuca latifolia* Raeusch. Nom. ed. 3: 142 (1797), nomen.

**MISAPPLIED NAME:**

*Melaleuca leucadendron* (L.) L. var. *saligna* (Schau.) F. M. Bail. Syn. Qd Fl. 170 (1883); (Schau.) Domin, Biblioth. Bot. 89: 456 (1928); non *M. saligna* Schau.

Tree 15-40 m high with a green often long crown, the smaller branches and twigs commonly long slender and drooping. Bud-scales glabrous or the lower ones ciliolate. Young shoots silky with short appressed hairs soon becoming glabrous.

Leaves soon glabrous; petioles plano-convex, 6–12 mm long, 1–1.8 mm wide, curved; blades thinly coriaceous, narrowly lanceolate, rarely  $\pm$  elliptic, acute or acutely acuminate, straight, incurved or recurved in the upper part, attenuate to the petiole from well below (rarely from about) the middle (8.5–) 10–19.3 cm long, (0.9–) 1–2 (–2.5) cm wide, (6–) 7–14 times as long as wide, 5-nerved with the external pair sometimes faint or ill developed, the inner ones 0.2–0.3 mm wide, the cross veins sometimes inconspicuous. Spikes 1–3 together and terminal, commonly also solitary in the upper axils forming a raceme of spikes from the fall of the leaves, mostly 6–15 cm long and about 2.2–3.0 cm wide, very loose to fairly dense-flowered; rhachis glabrous, 0.85–1.3 mm thick. Flowers  $\pm$  white or creamy white. Calyx entirely glabrous, 3–4 mm long; tube broadly subcylindrical infundibuliform, rugose when dry, 1.8–2.7 mm long, 1.8–2.5 mm wide; sepals nearly semicircular, 0.7–1.5 mm long, 1.6–2 mm wide, thick and irregularly nerved and glandular, with a broad, subscarios ciliate to glabrous margin 0.25–0.3 mm broad. Petals obovate spathulate with a short broad claw and a suborbicular minutely ciliate lamina, in all about 2.3–4 mm long and 2–4 mm wide, with 7 slender branched veins and a few glandular dots sometimes elongated but rarely linear. Stamens 5–7 in each bundle, the bundles about 10–13 mm long; anthers oval-oblong, 0.5–1.1 mm long. Fruit about 3.2–4.3 mm long, and 3.6–4.6 mm wide. Figs. 1, 14 A, 15 A.

MOLUCCAS.—OBI: Woi Besar, in 1899, *Atasrip* 115. AMBOINA: Near Hoekoerila,  $\pm$  0–50 m, Apr. 1918, *Kornassi* 1144; without further locality, Oct. 1796, *Ch. Smith* 302; July 1821, *Reinwardt* 1462, *de Vriese*, *Teysmann*, *Zippelius*; no collector's name, L.908, 154–191; "Moluccas" probably Amboina, MEL ex L; Amboina, cult. in Hort. Bot. Bog. V. A. 68a. ARU IDS.: P. Kobroör, Dosinamalaoe, few m, June 1938, *Buwalda* 5144.

NEW GUINEA.—WEST NEW GUINEA: Gebeh: *Teysmann* 1. Misoöl, Waigamma, Jan, 1876, *Beccari*; Sorong, Aug. 1948, *Main* 525; Sorong, Sept. 1948, *Pleyte* 841, 977; Hasvakke, [July 1872], *Beccari*; Agonda, Mar. 1937, *Neth. Ind. For. Serv. b.b.* 22322; Babo,  $\pm$  20 m, Nov. 1936, *Neth. Ind. For. Serv. b.b.* 21813; Babo, 10 m, Aug. 1941, *Aët* 692; Lake Wam, Aug. 1954, *van Royen* 4762; Merauke, Djidjoeroeg, 5 m, Mar. 1954, *Dijkstra B.W.* 582. PAPUA: Western Division: Daru Island, Mar. 1934, *Brass* 6041. Central Division: Port Moresby, *Spencer*. Eastern Division: Sandbank Bay, June 1926, *Brass* 1638.

WESTERN AUSTRALIA.—NORTHERN PROVINCE: King Sound in 1888, *Froggat* 92; Pender B., Oct. 1919, *Lane-Poole* 484; Camden Sound, May 1921, *Gardner* 1329 (partly); Prince Regent R., June 1921, *Gardner* 1379; Isdell R., near Grace Knob, May 1905, *Fitzgerald*; Skull Ck., Aug. 1937, *Stokes* 56; Ord R., Kimberley Research Stn., June 1952, *Langfield* 317; Woodstock Stn., S. of Port Hedland, Aug. 1957, *Ealey* E. 119.

NORTHERN TERRITORY.—DARWIN AND GULF DISTRICT: Coast of Bathurst Island, June 1933, *Jacobs* 39A; SW. of Danger Point, Coburg Pen., July 1961, *Chippendale in NT*.8288; Escape Cliffs, *Hulse*; Port Darwin, *Schultz* 500; Darwin in 1930, *Bleeser*; Darwin, July 1958, *Trapnell* 116; Howard Springs, *N.S.W. Forestry Commission* 2301; Port Essington, Coral Bay, Jan. 1958, *Bateman*; Bulman Prospect, Mt. Marumba, Sept. 1953, coll.?.; Point Keats, June 1952, *Keast* 1; Oenpelli, Dec. 1962, *Beens & Spence LB*.21, *LB*.25, *LB*.28; Hayes Creek, 13° 35' S., 131° 29' E.,  $\pm$  107 m, June 1946, *Blake* 16169; Elsey Station, banks of Roper River, June 1950, *Bateman* 14.

QUEENSLAND.—BURKE DISTRICT: Wollagorang Stn., *J. H. Smith*; Bentinck I., June, 1901, *J. F. Bailey*; Gregory River near Burketown, July 1928, *MacGillivray* 2177A; Doomadgee Mission, March 1961, *Fawcett* 14; Lorraine Stn., Apr. 1954, *Everist* 5264; near Morstone

Stn., May 1948, *Perry* 1023. COOK DISTRICT: Cape York, Mar. 1868, *Daemel*; "Lockerbie," 10 miles WSW. of Somerset, 20 m, May, 1948, *Brass* 18613; Brown's Creek, Pascoe R., 60 m, July, 1948, *Brass* 19642; Cape York Peninsula, in 1930, *Thomson* 31; Endeavour R., *Persieh* 55, June 1819, *Cunningham* 253/1819, in part; Cooktown, July 1943, *Blake* 15076; near (S. of) Cooktown, July 1958, *Salmon*; Bloomfield R., Nov. 1928, *Petrie*; Bailey's Creek, sea level, Oct. 1962, *Smith* 11622; N. of Mossman, about sea level, Feb. 1958, *Blake* 20279; Port Douglas, 0 m, May 1952, *Everist* 5120; Mt. Molloy, 360 m, Apr. 1932, *Brass* 2495; Mt. Molloy, Aug. 1963, *Blake* 22091; 10 miles S. of Mt. Molloy, 330 m, July 1962, *Hoogland* 8513;  $\pm$  10 miles ENE. of Mareeba,  $\pm$  450 m., June 1962, *Hoogland* 8500; Parada, July 1957, *Keefer* 5; Davies Ck., Aug. 1957, *Webb & Smith* 3329; Cairns, *Michael* 667; Stratford near Cairns, July 1954, *Blake* 19673; Gordonvale, Jan. 1921, *Illingworth* 89; Stannary Hills in 1908, *T. L. Bancroft*; Range Road, Atherton Tableland, 300 m, Oct. 1929, *Kajewski* 1303; Brampton Beach, E. of Babinda, near sea level, Aug. 1957, *Webb & Tracey* 3334; Georgetown, Feb. 1922, *White*. NORTH KENNEDY DISTRICT: Rockingham Bay, *Cunningham* 253/1819 in part, June 1865, *Dallachy*; Hinchinbrook I., July 1963, *Salmon*; Mt. Fox, SW. of Ingham, Nov. 1949, *Clemens*; Magnetic I., Feb. 1918, *White*; Arcadia, Magnetic I., July 1952, *Messmer*; Townsville, *White*; "Myola", W. of Charters Towers, Dec. 1959, *Hall* 2; Charters Towers, July 1961, *Volck* 1947; Burdekin River, [*Fitzalan*]; Scott's Creek near Mt. Woodhouse, SW. of Ayr, June 1949, *L. S. Smith* 4301; SW. of Ayr, near Mt. Dalrymple, Oct. 1950, *Blake* 18669; near (NW. of) junction of Bowen and Burdekin Rivers, Oct. 1950, *Blake* 18692; Bowen R., *Bowman*; Houghton R., Aug. 1863, *Dallachy*; Bowen district, *Young*; Spring Creek near Bowen, Aug. 1963, *Blake* 22117; Bowen, in 1962, *Wyatt* 7; near Ben Lomond Mining Reserve, July 1936, *Macpherson* 79A; Vine Creek near Proserpine, Aug. 1936, *Macpherson* 79; Kelsey Creek near Proserpine, *Michael* 1042. SOUTH KENNEDY DISTRICT: Near Mackay, May 1962, *Stevens*; Sarina, May 1921, *Francis*; S. of Sarina, May 1927, *Francis*; Mt. Christian, banks of Rocky Dam Creek, May 1927, *Francis*; "Laglan", March 1958, *Smith* 10301. PORT CURTIS DISTRICT: Broad Sound, *Bowman* 35; Shoalwater Bay, etc., Sept. 1802, *R. Brown*; Byfield, Sept. 1931, *White* 8149; Rockhampton, *A. Dietrich*, in 1903, *Simmons*, June 1913, *Boorman*, July 1920, *White*, Feb. 1927, *White* 3366, May 1956, *Blake* 19932. LEICHHARDT DISTRICT: Coomooloolaroo Stn., about 15 miles SW. of Duaringa, Jan. 1954, *Everist & Johnson* 3.

CULTIVATED, origin not stated: India, Calcutta Botanic Garden, *Wallich* 3646. Ceylon, Peradiniya Bot. Gardens, Feb. 1939, *White*. Sumatra, Medan, Sept. 1923, *Lörzing* 10161, Sept. 1927, *Lörzing* 12058. Jamaica, Hope Gardens, Jan. 1904, *Harris*.

*M. leucadendron* is widely spread in northern and north-eastern Australia, southern New Guinea and thence north-west to Amboina (fig. 16). In Australia it is most commonly found as a rheophyte on sandy or gravelly river banks often forming a nearly pure fringing forest up to 25 m high. However, in north-eastern Queensland it forms forests on the old dunes near the coast, on rocky foreshores, and on swampy ground. There are a few records of its forming communities away from river banks in New Guinea (*Brass* 6041, 1638, *Pleyte* 841) and Rumphius described it as growing on what is probably laterite in Amboina. Because of the long slender drooping branchlets and leaves it is often called "weeping tea-tree".

The species is rather easily distinguished by the long narrow thin-textured leaves widest usually distinctly below the middle and the complete absence of indumentum except on the very youngest shoots and the margins of the sepals and petals.

Cheel, loc. cit., stated that the Australian plants had pink or pale reddish flowers (p. 294) and (p. 295) that "the flowers, however, are in most cases pinkish or reddish as mentioned by Bailey". Bailey, Syn. Qd Fl. 170 (1883) stated that the flowers were "often dark coloured" and in Qd Fl. 2: 601 (1900) that the stamens were "sometimes stained with red". These remarks must have been based on dry, or at least withered specimens; such colours have not been reported by the collectors of any specimen seen.

Flowering may occur at almost any time of the year, but chiefly during the months May–September.

Rumphius recognised two species in Amboina which he called *Arbor alba* and *Arbor alba minor*, quoting the Malayan name Caju puti for both and for the second also Caju kilan and Daun (poëti) kitsjil. The descriptions, based on macroscopic characters, are excellent; they leave no doubt as to the species he had in mind and should be accepted as the basis of interpretation of his names. The plates are crude but the drawings from which they were prepared were probably not seen by Rumphius for the reasons given by Merrill, Interpret. Rumph. Herb. Amboin. 15–16 (1917). Rumphius went blind in 1670; the original plates for the work or most of them were destroyed by fire in 1687 and they were then replaced by drawings by different artists but Rumphius could not determine how well they represented the plants he had described. It is evident that t. 17 fig. 2 was not drawn by the artist that drew t. 16 and t. 17, fig. 1. *Arbor alba* as to description is clearly *Melaleuca leucadendron* as circumscribed in this paper and the figure (t. 16) with its pendulous leaves roughly agrees if it can be taken as much less than natural size (as the fruits suggest), while *Arbor alba minor* as to description and almost as much as to the figures is just as clearly *M. cajuputi*, but because *M. leucadendron* is not known west of Amboina, Rumphius's remarks on *Arbor alba* in Java and Bali must refer to *M. cajuputi*.

The first use (1754) of the words *Myrtus leucadendra* was in a dissertation entitled "Herbarium Amboinense" which consisted chiefly of an identification of the plants figured in Rumphius, Herbarium Amboinense with species described in Species Plantarum, for the preparation of which the work of Rumphius was not available. This work has been discussed by Merrill, Interpret. Rumph. Herb. Amboin. (1917) and Rickett, Lloydia 18: 55–57 (1955). Not all Rumphian names were equated with Linnaean names; some were identified with the names of Rheede, Hort. Malabar. (not binomial) or left unidentified and for a few others new names were proposed including "16, 17. *Arbor alba*. *Myrtus Leucadendra*, *baccis sessilibus urceolatis*, *foliis lanceolatis*;" it is doubtful whether the last is a polynominal or a binominal with diagnostic phrase run on. The dissertation was "defended" by O. Stickman and by some he has been quoted as the author of the name *Myrtus Leucadendra*, but it has been more generally accepted that Linnaeus himself must be accepted as the author of these dissertations or at least of any new names therein. Collections of them were reprinted as Amoenitates Academicæ with only the name of Linnaeus on the title page, sometimes with alterations; the entry under discussion was reduced to "16, 17. *Arbor alba*. *Myrtus Leucadendra*". Rickett, loc. cit., suggested that names in

Stickman should be rejected as of doubtful validity; with this in mind Rickett and Stafleu, *Taxon* 9: 71 (1960), in their study of nomina conservanda cited *Sp. Pl.* ed. 2: 676 (1762) as the place of publication of *Myrtus leucadendra*, and this now stands in the International Code of Botanical Nomenclature 1961.

*Melaleuca leucadendron* was based on *Myrtus leucadendron* ("Leucadendron") with a reference to "Arbor alba Cayputi. *Rumph. amb.* 2. p. 72. t. 16, 17. f. 1," thus excluding fig. 2. Shortly after, fig. 2 was referred by the younger Burman to *Myrtus saligna* Burm.f. (see under *Melaleuca cajuputi*). Merrill followed Linnaeus in treating *Arbor alba* and *Arbor alba minor* as conspecific.

The epithet was originally spelt *Leucadendra* and this spelling was adopted by Linnaeus in later works but not consistently so. For instance under *Melaleuca Leucadendra* in *Mant.* 105 (1767), *Syst. Nat.* ed. 12: 509 (1767), ed. 13: 509 (1770) Linnaeus quoted *Myrtus Leucadendron* as a synonym. The younger Linnaeus wrote "*Melaleuca Leucadendron*", quoting *Melaleuca Leucadendra* *Syst. Veg.* ed. 13: 582 as a synonym. This altered spelling has been widely used since. Although Linnaeus was not consistent in his spelling of the epithet he always used an initial capital, a practice apparently reserved for nouns in apposition. This, and the old established generic name *Leucadendron* (Proteaceae) suggest that the altered spelling should be accepted as the correct one. It has been used in citing the type of *Melaleuca* in the list of Nomina Conservanda in the International Code of Botanical Nomenclature (1961).

While this paper was passing through the press it was found that the epithet was spelt *leucadendra* in the 1966 edition of the Code.

After the publication of *Myrtus leucadendra* Linnaeus must have seen a specimen that suggested that the species was wrongly placed in *Myrtus*; possibly it was a specimen in hb. van Royen now in hb. Leiden. Later he received two specimens now in the Linnaean Herbarium from which his son described *M. leucadendron*  $\alpha$  *latifolia* and *M. leucadendron*  $\beta$  *angustifolia*. The second name referred to a new variety based on a specimen received from Baeck and discussed below under *M. quinquenervia*. The first name, however, must be understood as referring to the "typical" variety and nomenclaturally is based on *Myrtus leucadendra*. The specimen is not the type of *Melaleuca leucadendron* as supposed by R. T. Baker when he published a photograph of it in *J. & Proc. Roy. Soc. N.S.W.* 47: plate 8 and by Cheel. Both believed that the specimen came from India but it is undoubtedly part of a collection represented at Stockholm and Uppsala made by Thunberg in Java in 1777, presumably from the tree in a garden near Djakarta (Batavia) referred to by him in *Dissertatio de oleo cajuputi* 3 (1797); the specimens belong to *M. cajuputi*.

*Melaleuca mimosoides* was based on a fruiting specimen, and the specimen at the British Museum agrees with the protologue; the locality on the label is Rockingham Bay. There is other material at Kew, including one sheet in flower and young fruit bearing the same number with the locality given as "Endeavour"

[River]. From Cunningham's MS at Kew it is evident that Cunningham grouped material from both localities under the same number. Schauer did not give a precise locality in the protologue and I have not located a holotype. Both collections are certainly conspecific.

The type of *M. amboinensis* is a specimen of *M. leucadendron* originally in flower but with only a few fragmentary ones remaining. It was collected by de Vriese on Amboina and had been distributed from Leiden.

*Leptospermum leucadendron* was based on *Melaleuca leucadendron*. In our copy of the Forsters' work the page is numbered 48, evidently in error. In Index Kewensis the epithet is spelt *Leucadendrum* and the name is referred to (*L.*) *flavescens*, *pubescens*, in spite of the Forsters' synonymy and the statement "Stamina polyadelpha".

The combination *Cajuputi leucadendra* was published without reference to *Myrtus leucadendra* on which it was evidently based, and without indication that it was a new combination.

*Melaleuca latifolia* Raeusch. is a nomen nudum. It is referred to *M. leucadendron* in Index Kewensis, and was probably intended for *M. leucadendron* var. *latifolia*.

F. M. Bailey and Domin independently made the combination *M. leucadendron* var. *saligna* (Schau.) and both misapplied the name to *M. leucadendron*. *M. saligna* is a very different species.\*.

In Queensland the species is known as River tea-tree and Weeping tea-tree, in Amboina as Kajoe pouth or Cajuputi. Cajuput or Cajuput tree is sometimes mentioned as an English name for the species but cajeput oil comes from *M. cajuputi*.

**2. *Melaleuca cajuputi*** Powell, Pharm. Lond. Transl. 22 (1809), Roxb. Fl. Ind. 3: 394 (1832), non *M. caja-putti* Hort. ex DC. (1828). Based on *Abor alba minor* Rumph. Herb. Amboin. 2: 76, t. 17 (1750), restricted to fig. 1 by Roxburgh.

*Arbor alba minor* Rumph. Herb. Amboin. 2: 76, t. 17 (figs. 1 and 2) (1750). Type: Description and figures from plants from the Moluccas.

*Myrtus saligna* Burm. f. Fl. Ind. 116 (1768), *syn. nov.* Type: A specimen from Java (G) with Rumph. Herb. Amboin. 2: t. 17, f. 2 cited; fragment seen.

*Myrtus saligna* Gmel. Syst. 793 (1791). Based on Rumph. op. cit. 2: t. 17, f. 2.

---

\* Bailey made many new combinations in this work (Synopsis of the Queensland Flora) but they have been commonly overlooked because there is no indication that they are new and synonyms are not cited. From a study of the work and Bailey's preface it is clear that the work is based on Bentham's *Flora Australiensis* and names must be interpreted by reference to this. The implied basionyms of the new names may be accepted names in Fl. Aust. or they may be cited there as synonyms or possible synonyms.



- Melaleuca minor* Sm. in Rees Cyclop. 23, no. 2 (1812). Type: "The Moluccas" (= Amboina), *Ch. Smith* 303; (holotype, LINN not seen; isotypes, NSW, BM (photo BRI), G).
- Melaleuca viridiflora* "Sm." var. *angustifolia* Bl. Bijdr. 1099 (1826), non *M. leucadendron* (L.) L. var. *angustifolia* L. f. (1781), nec *M. angustifolia* Gaertn. (1788). Type: Moluccas (Amboina), *hb. Blume* (L).
- Melaleuca trinervis* Buch.-Ham. Mem. Wern. Soc. 6: 302 (1832), non *M. (?) trinervia* Sm. in White (1790); *syn. nov.* Based on *Arbor alba minor* Rumph. as to t. 17, f. 1.
- Melaleuca lancifolia* Turcz. Bull. Soc. Imp. Nat. Mosc. 20: 164 (1847), *syn. nov.* Type: *Cuming* 2427 from Sumatra (holotype, KW (?), not found; isotypes, FI photo BRI, K, P, W).
- Melaleuca cumingiana* Turcz. Bull. Soc. Imp. Nat. Mosc. 20: 164 (1847), *syn. nov.* Type: *Cuming* 2272 from Malacca (holotype KW not seen, photo BRI; isotypes, BRI, L, MO, MEL, FI, K, P, W).
- Melaleuca saligna* (Gmel.) Bl. Mus. Bot. Lugd. Bat. 1: 66 (May 1849), non Schau. (1843). Based on *Myrtus saligna* Gmel.
- Melaleuca angustifolia* (Bl.) Bl. Mus. Bot. Lugd. Bat. 1: 83 (June 1849) in nota, non Gaertn. (1788). Based on *M. viridiflora* var. *angustifolia*.
- Melaleuca commutata* Miq. Anal. Bot. Ind. 14 (1850). Type: Borneo, *Korthals* (holotype, L; isotype, K).
- Melaleuca leucadendron* (L.) L. var. *lancifolia* (Turcz.) F. M. Bail. Syn. Qd Fl. 170 (1883). Based implicitly on *M. lancifolia* Turcz.
- Melaleuca eriorhachis* Gandoger, Bull. Soc. Bot. France 65: 26 (1918), *syn. nov.* Type: Singapore, *Ridley* (?) (LY, photo BRI).
- Melaleuca leucadendron* (L.) L. var. *minor* (Sm.) Duthie in Hook. f. Fl. Brit. Ind. 2: 465 (1878); (Sm.) Niedenzu, Natürl. Pfl.-fam. IV, 3 (7): 95 (1893); (Sm.) Cheel in Ewart & Davies, Fl. North. Territ. 299 (1917); (Sm.) Hegi, Fl. Mit. Eur. 5: 787 (1925). Based on *Melaleuca minor*.
- Melaleuca leucadendron* (L.) L. var. *cajuputi* ("Roxb.") Niedenzu, Natürl. Pfl.-fam. IV, 3 (7): 95 (1893); ("Roxb.") Hegi, Fl. Mit. Eur. 5: 787 (1925) (both as "*cajeputi*"). Based on *Melaleuca cajuputi*.
- Eucalyptus cochinchinensis* Hort. ex C. B. Robinson in Maiden, Crit. Rev. Gen. *Eucalyptus* 5: 183 (1921), nomen, *syn. nov.* Based on *Robinson* 1012 from Saigon.
- ? *Melaleuca leucadendron* var. *minor* Hort. ex Hall in L. H. Bail. Standard Cyclop. Hort. 4: 2022 (1916). No type.

A tree up to 35 m high with a fairly broad, often partly silvery crown, the smaller branches and twigs rather slender but not conspicuously long or drooping, sometimes flowering as a shrub. Bud-scales appressed silky hairy. Young shoots densely silky hairy with more or less spreading fine hairs about 0.3–2 mm long.

Leaves pubescent to glabrescent; petioles compressed to  $\pm$  concavo-convex 3–7 (–11) mm long, 1.1–2.0 (–2.3) mm wide, straight or curved, shortly pubescent; blades coriaceous or thinly coriaceous, silky to glabrescent, broadly to narrowly elliptical or  $\pm$  lanceolate-elliptic, sometimes obliquely so, acute or narrowly obtuse, sometimes more abruptly rounded towards base, 5–10 (–12) cm long, 1–4 cm wide, 2–7 times as long as wide, 5–7-nerved with the veins 0.3 mm wide and the reticulations nearly as prominent, finely dotted. Spikes 1–3 together, terminal, 3.5–9 cm long, 2–2.5 cm wide, fairly densely flowered; rhachis 1–1.3 mm thick, densely pilose with spreading hairs 0.2–1.5 mm long. Flowers white, greenish white or cream. Calyx 2.5–3.0 mm long, pubescent for the greater part with spreading hairs; tube broadly subcylindrical, 1.2–1.9 mm long, 1.5–2.0 mm wide, pubescent outside shortly so inside; sepals semicircular or nearly so, 0.7–0.9 mm long, 1.2–2 mm wide, the middle basal part thick, glandular, pubescent to nearly glabrous outside, sparsely pubescent or glabrous within, with a thinner subscarios glabrous margin 0.25–3 mm wide with glabrous or ciliate edges. Petals obovate-spathulate with a short broad claw and a suborbicular minutely ciliate concave lamina in all about 2–2.7 mm long and 1.8–2.3 mm wide, with 7 slender  $\pm$  branched veins and streaked with linear and elliptic to oblong glands. Stamens 7–9 in each bundle which is about 7–10 mm long; anthers elliptic, 0.4–0.55 mm long. Fruit about 3–3.5 mm long and 3.5–4 mm wide with thinner valves than in most species. Figs. 2, 14 B, 15 B.

BURMA.—MERGUI DISTRICT: Mergui, *Griffith* 1116 c; Wetto, on Lenya R., Feb. 1927, *Parker* 2678; Maliwun, Jan. 1930, *Parker* 3165.

THAILAND.—Sriracha, April, 1920, *Marcan* 225, about 9 m, Dec. 1927, *Collins* 1757; Chantabun (Chantaburi), Dec. 1924, *Kerr* 9575, Nov. 1930, *Lakshnakara* 535; Kaw Chang, June 1925, *Rabil* 23; Chumpawn (Chumpon), under 50 m, Jan. 1927, *Kerr* 11630; Kaw Pa-ngan, June 1927, *Pitt* 835; Kaw Samui, under 5 m, May 1928, *Kerr* 15701, Lem Pia, Trang, Jan. 1917, *H.C.R.* 6436; Satul,  $\pm$  5 m, Dec. 1927, *Kerr* 13706, 13737; near Singora (Songkla, Sonkhla), Apr. 1899, *Gwynne-Vaughan* 351, Feb. 1916, *Annandale*; Singora, Jan. 1928, *Kerr* 15111; Patalung, Oct. 1915, *Vanpruk* 765; Kok Po, below 100 m, May 1919, *Kerr* 3693.

INDO-CHINA.—ANNAM: Tourane and vicinity, May–July 1927, *J. & M. S. Clemens* 3971; Nha-Trang, Mar. 1911, *C. B. Robinson* 1092. COCHIN-CHINA: Saigon, Mar. 1911, *C. B. Robinson* 1012; near Chandoc, in 1867, *Pierre* 1158.

MALAYA.—Membak, *C. Smith* 9013; [N. of] Malacca, Jan.–Feb. 1961, *Womersley* 26; Malacca, *Cuming* 2272, *Griffith*; Singapore, Sept. 1896, *Schlesich bot. Tauschverein* 854, in 1898, *Ridley*, Dec. 1949, *Sinclair in SFN* 38861.

SUMATRA.—Without definite locality, *Cuming* 2427; Palembang, *Praetorius*, *Teysmann*; Soengei Ringit, Dec. 1947, *Verboom* 13. Bangka, [April 1857], *Teysmann*. RHIO ARCHIPELAGO: Rhio,  $\pm$  100 m, Oct. 1919, *Bünnemejer* 7667. BILITON: near Manggar, May 1926, *Burger* 4, in 1954, *Faber* 2.

BORNEO.—WEST BORNEO: Pontianak, Mar. 1931, *Mondi* 83. SOUTH AND SOUTH-EAST BORNEO: Sampit, April 1948, *Dahri* 46; Tanangrogot, July 1908, *Winkler* 3114; Banjarmasin, July–Nov. 1836, *Korthals*.

JAVA.—BATAVIA: W. of Kali Angke, 1–2 m, Nov. 1937, *van Steenis* 10569.

TIMOR.—Pariti,  $\pm$  10 m, *Neth. Ind. For. Serv. b.b.* 26357; Tjamplong,  $\pm$  300 m, Dec. 1925, *Neth. Ind. For. Serv. b.b.* 9561; Toca badak,  $\pm$  10 m, *Neth. Ind. For. Serv. b.b.* 24744.

TANIMBAR ISLANDS.—JAMDENA: Otimmer, low alt., Mar. 1938, *Buwalda* 4376. SELARU: SE. of Namtabung, Mar. 1956, *Borssum Waalkes* 3210.

MOLUCCAS.—BURU: Feb. 1860, *de Vriese*; cult. in Hort. Bog. V. B. 1; Wa Tele Lalmata,  $\pm$  50 m, Aug. 1936, *Neth. Ind. For. Serv. b.b.* 21512; Djikoemerasa,  $\pm$  100 m, July 1936, *Neth. Ind. For. Serv. b.b.* 21482; Kajeli, *Teysmann*,  $\pm$  60 m, July 1936, *Neth. Ind. For. Serv. b.b.* 21478. CERAM: between Eti and Kaibobo, *Rutten* 1654. AMBOINA: Oct. 1796, *Ch. Smith* 303, *de Vriese*, *Forsten*, hb. *Blume*. KEY ISLANDS: *Jaheri*.

NEW GUINEA.—WEST NEW GUINEA: Merauke, 5 m, Oct. 1953, *Versteegh B.W.* 54, *B.W.* 58; Koerik, near Merauke, June 1961, *Hoogerwerf* 3, 22, 58. PAPUA: WESTERN DIVISION: Lake Daviumbu, Middle Fly R., Sept. 1936, *Brass* 7956; Fly R., *d'Albertis*, in 1890, *Macgregor*; Lower Fly R., E. bank opposite Stuart I., Oct. 1936, *Brass* 8147; Fly R. delta, in 1890, *Macgregor*; Wuroi, Oriomo R., Jan.–Mar. 1934, *Brass* 5814; Oriomo R.,  $8^{\circ} 50' S.$ ,  $143^{\circ} 15' E.$ , 21 m, Jan. 1959, *White & Gray in NGF.* 10434; Daru I., Mar. 1936, *Brass* 6372; Mabaduan, Apr. 1936, *Brass* 6548; Mai Kussa, in 1890, *Macgregor*; "Hynes R.", in 1890, *Macgregor*. CENTRAL DIVISION: between Brown and Laloki Rivers, *NGF.* 8223, 8224.

WESTERN AUSTRALIA.—NORTHERN PROVINCE: 19 miles NE. of Fitzroy, Sept. 1959, *Lazarides* 6492.

NORTHERN TERRITORY.—DARWIN AND GULF DISTRICT: Darwin, *Menzies* (sterile); about  $12^{\circ} 40' S.$  and  $131^{\circ} 25' E.$ , Sept. 1946, *Blake* 17001; Yirrkala,  $12^{\circ} 12' S.$ ,  $136^{\circ} 47' E.$ , Aug. 1948, *Specht* 875; Bickerton I., June 1948, *Specht* 631, Little Lagoon, Groote Eylandt, May 1948, *Specht* 414; Port Keats, June 1952, *Keast* 3; near Providence Hill, Oct. 1855, *Mueller*; Fitzmaurice R., Oct. 1855, *Mueller*; Bitter Springs, near Mataranka, June 1954, *Garden*; near (E. of) Mataranka, Apr. 1947, *Blake* 17511.

QUEENSLAND.—COOK DISTRICT: Newcastle Bay, May 1948, *Brass* 18677; Sanamere Lagoon, Jardine R., May 1948, *Brass* 18854; Brown Creek, Pascoe R., July 1948, *Brass* 19614; near Cairns, May 1962, *Blake* 21788.

CULTIVATED, origin unknown.—West Pakistan, Lahore, Apr. 1924, *Parker*. India, Saharumpora, *Thomson*, Calcutta Botanic Gardens, *Wallich* 3645, Jan. 1878, *Gamble* 5811A, 5811B, Pondicherry. Singapore, *Ridley* ?, *J. & M. S. Clemens* 22495, *Burkill in Gardens no.* 169. North Borneo, Sandakan, *SAN.* 26601, 32557. Java: near Batavia, in 1777, *Thunberg*, hb. *Blume*. North America: Missouri Botanic Gardens, Sept. 1906, *Kellogg*.

*Melaleuca cajuputi* is now widely spread from northern Australia through Malaysia to India and Indo-China (fig. 17), but it has been cultivated from early times and is possibly not indigenous throughout its present range. It commonly forms pure forest communities on swampy ground. According to van Steenis, *Tectona* 31: 892, 894, 895, 897, 901 (1938) it forms brackish swamp forests in Java, Sumatra and Borneo immediately behind mangroves and great savannahs in Buru and Ceram. In Burma it sometimes occurs as a shrub or small tree on the edge of tidal forests while in Annam and Queensland it has been found on coastal dunes as a shrub of 1 m (*Clemens* 3971) or 0.5–1.5 m (*Brass* 18677). *Brass* 19614 was from shrubs of 1–2 m in an amphibious scrub. *Blake* 17001 was from trees associated with *M. viridiflora* in a forest dominated by *M. dealbata* and *Blake* 21788 was from a few trees in *Eucalyptus* forest.

The short flowers with pubescent rhachis and calyx sometimes with eciliate margins to the sepals distinguish this species from other members of the group, but there is unusual variation in leaf-index; broader leaves are less common. Red-flowered trees have not been recorded. The chief flowering times are March–June and August–December.

Of the names cited above, *Melaleuca cajuputi*, *Myrtus saligna* Gmel. non Burm. f., *Melaleuca trinervis* Buch.-Ham. and *Melaleuca saligna* (Gmel.) Bl. non Schau. are all based on the figures, or descriptions and figures of *Arbor alba minor* Rumph., and these were cited at least in part in the protologues of *Myrtus saligna* Burm. f. and *Melaleuca minor* Sm. Rumphius's t. 17 consists of two figures evidently drawn by different artists, one of whom also drew t. 16. Figs. 1 and 2 look so unlike that some botanists have been unable to reconcile them as representing one species. Burman and Gmelin referred to *Myrtus saligna* only fig. 2. The name *M. cajuputi* has usually been attributed to Roxburgh (p. 347) although the latter cited Powell. Powell based *Melaleuca cajuputi* on t. 17 without mentioning figures; this was commented on by Roxburgh, who thought fig. 1 alone was meant, and his remark may be taken as the selection of fig. 1 as lectotype. Buchanan-Hamilton based *Melaleuca trinervis* entirely on fig. 1 believing that f. 2 "is the *Metrosideros saligna*, not described in Herbarium amboinense". This interpretation of f. 2 cannot be accepted; *Metrosideros saligna* Sm. (*Callistemon salignus* (Sm.) DC.) is a plant of eastern Australia that Rumphius would certainly not have seen. *M. trinervis* is a later homonym of *Melaleuca* (?) *trinervia* Sm. in White, Journ. Voy. N.S.W. App. 229, t. 24 (1790) based on a specimen without flower or fruit from near Sydney (LINN ?), the description and figure of which suggest a species of *Leptospermum*.

Burman seems to have taken his characters at least in part from Rumphius t. 17, fig. 2 (f. 1 being referred with t. 16 to *M. leucadendron*) though he mentioned a specimen from Java. The figure shows fruits exactly opposite and they were so described by Burman, but I have never seen flowers or fruits so arranged in any member of the group. Relatively recently specimens of *Melaleuca* were discovered in Burman's Herbarium now at Geneva, and Prof. C. G. G. J. van Steenis informed me that there is one sheet written up by Burman: "ex Java 1760. *Myrtus saligna*. Burm. n. sp. Ind. p. 116". This must be accepted as the type; the specimen has unusually narrow leaves and is so pressed and mounted that many flowers and fruits appear to be paired and opposite. Leaves just as narrow are characteristic of some sterile specimens collected by Brass on Buru (Boeroe) from coppice growth, the result of continued pruning for the distillation of oil.

The type of *Melaleuca minor* is from Amboina collected by Christopher Smith No. 303, October, 1796, during his search for the species producing Cajeput oil; an isotype is well figured in Bentley & Trimen, Med. Pl. 2: t. 108 (1876). Roxburgh's account of *M. cajuputi* was based on plants thirteen years old in the Calcutta Botanic Garden brought from "the Molucca Islands" by Ch. Smith.

The name *Melaleuca cajeputti* Hort. ex DC. was published as a synonym of *M. squarrosa* Donn and refers to a species quite different from *M. leucadendron* and its close allies.

*Melaleuca viridiflora* "Sm." var. *angustifolia* Bl. was based on specimens from Amboina, possibly collected by Reinwardt although no collector's name is on the labels. Later, Blume decided that the plant was distinct from *M. viridiflora*, identified it with *Myrtus saligna* Gmel. and made the transfer *Melaleuca saligna* (Gmel.) Bl. overlooking *Melaleuca saligna* Schau. He soon realized this and

proposed *Melaleuca angustifolia* for the taxon, apparently taking the epithet from his earlier *M. viridiflora* var. *angustifolia* but overlooked the fact that the new name (or combination) was a later homonym of *M. angustifolia* Gaertn. proposed for a very different species of series *Circumscissae* Benth.

*M. lancifolia* and *M. cumingiana* were founded on *Cuming* 2427 (from Sumatra) and *Cuming* 2272 (from Malacca) respectively. The only tangible difference from Turczaninow's descriptions is that in *M. lancifolia* the staminal bundles cohere at the base by an auricle while they are free and not auricled in *M. cumingiana*. Bentham (Fl. Aust. 3: 143) could not find the auricles and it is probable that on the specimens seen by Turczaninow some of the stamens were falling away with the bundles cohering at their base. This happens in other species, but is not constant in any. The specimens seen from Sumatra differ in no way from those from Malacca.

*Melaleuca commutata* was described from a Korthals collection from Borneo though *Melaleuca leucadendron* var. *a* L. f. was cited.

Though no synonymy was cited there can be little doubt that Bailey based *M. leucadendron* var. *lancifolia* indirectly on *M. lancifolia* Turcz., interpreting the latter, though wrongly, from Bentham's remarks in Fl. Aust. and the epithet; his own remarks leave no doubt that he had *M. quinquenervia* in mind but his mention of greenish flowers suggests that he may have intended to include *M. nervosa* in the concept (for note on publication see footnote to p. 22).

*Melaleuca eriorhachis* Gandoger was founded on a specimen from Singapore, apparently collected by H. Ridley. There are two pieces on the type sheet with most of the stamens, styles and petals lost. The specimens certainly represent *M. cajuputi*, with relatively broad leaves, about 2.5–3 times as long as broad.

*Eucalyptus cochinchinensis* Hort. is a nomen nudum and has to be interpreted by Robinson's remarks and specimens (*Robinson* 1012 and 1092) quoted by Maiden, especially 1012 from Saigon, from the label to which the published remarks were taken; there is no reference to the name on *Robinson* 1092.

According to L. H. Bailey, Standard Cyclop. Hort. 4: 2002 (1916), "A low pyramidal form (of *M. leucadendron*) with narrow lvs. and silky fls. is sometimes listed as var. *minor* Hort." This could be a state of *M. cajuputi*. Cheel, loc. cit., referred three Australian collections of *M. nervosa* to *M. leucadendron* var. *minor* but in Herb. Brisbane several other sheets were so determined and the latter name has been commonly used in Queensland for *M. nervosa*.

As mentioned under *M. leucadendron*, there is a specimen of *M. cajuputi* in the Linnaean Herbarium collected by Thunberg from a tree in a garden near Batavia (Djakarta), Java, from which the younger Linnaeus diagnosed *Melaleuca leucadendron a latifolia* though it is not the type of this name.

The epithet *cajuputi* is derived from the Malayan vernacular name variously written Caju puti, Kaju puti, Kaju Puteh and Kajoe poeti. Gëlam is another name used in Malaya. The oil from the plant is Cajeput, Cajaput or Cajuput oil.

3. **Melaleuca quinquenervia** (Cav.) S. T. Blake, Proc. Roy. Soc. Qd 69: 76 (1958). Based on *Metrosideros quinquenervia*.

*Metrosideros quinquenervia* Cav. Ic. et Descript. Pl. 4: 19, t. 333 (1797).  
Type: Port Jackson, April 1793, *Née* (MA), figured by Cavanilles, loc. cit., now lost.

*Metrosideros coriacea* Poir. Encycl. Suppl. 3: 685 (1813); non Salisb. (1796), *syn. nov.* Type: New Caledonia, *Labillardière* (holotype, FI, photo BRI; isotype, MEL, P).

*Metrosideros albida* Sieb. ex Spreng. Syst. Cur. Post. 194 (1827) pro *syn.*, et ex DC. Prodr. 3: 212 (1828) pro *syn.*, *syn. nov.* Type: *Sieber*, *Fl. Nov. Holl.* 319; isotype, MEL, M, K.

*Melaleuca leucadendron* (L.) L.  $\beta$  *angustifolia* L. f. Suppl. Pl. 342 (1781), *syn. nov.* Type: New Caledonia, *Forster* (holotype, LINN not seen, photo, BRI; isotypes, K).

*Melaleuca viridiflora* "Gaertn." var. *rubriflora* Brong. & Gris, Bull. Soc. Bot. France 11: 183 (1864), *syn. nov.* Type: near Balade, New Caledonia, *Vieillard* 451 (P, photo BRI).

*Melaleuca rubriflora* Vieill. ex. Brong. & Gris, Bull. Soc. Bot. France 11: 183 (1864) pro *syn.*, *syn. nov.* Type: As for *M. viridiflora* var. *rubriflora*.

*Melaleuca leucadendron* "L". var. *rubriflora* (Brong. & Gris) Guill. Ann. Mus. Col. Marseille 19:73 (1911), *syn. nov.* Based on *M. viridiflora* var. *rubriflora*.

*Melaleuca maidenii* R. T. Baker ex Baker & Smith, J. & Proc. Roy. Soc. N.S.W. 47: 201 (Feb. 1914) nomen: R. T. Baker, Proc. Linn. Soc. N.S.W. 38: 598 (March 1914), *syn. nov.* Lectotype: Port Macquarie, N.S.W., July 1895, *Maiden in NSW*. 20065 (NSW; photo, BRI).

*Melaleuca smithii* R. T. Baker, Proc. Linn. Soc. N.S.W. 38: 599 (1914), *syn. nov.* Several syntypes: Lectotype: Rose Bay, N.S.W., July 1913, *Laseron in NSW*. 20066 (NSW; photo, BRI).

*Melaleuca leucadendron* (L.) L. var. *albida* Cheel in Ewart & Davies, Fl. North. Territ. 301 (1917), excl. forma *ruscifolia* Cheel, *syn. nov.* Based on *Metrosideros albida*, *Melaleuca smithii* and *M. sieberi*.

*Melaleuca leucadendron* (L.) L. var. *coriacea* (Poir.) Cheel in Ewart & Davies, Fl. North. Territ. 297 (1917), quoad basionym, *syn. nov.* Based on *Metrosideros coriacea* Poir.

*Melaleuca leucadendron* "L". var. vel forma *nana* Brong. & Gris ex Guill. Bull. Bot. Soc. France 81: 6 (1934), *syn. nov.* Type: Near Nouméa, New Caledonia, *Balansa* 99 (P, photo BRI, K).

*Melaleuca leucadendron* "L". var. vel forma *latifolia* Guill. Bull. Soc. Bot. France 81: 6 (1934), nec *M. leucadendron* (L.) L. var. *latifolia* L. f. nec *M. leucadendron* (L.) L. var. *latifolia* Rivière, syn. nov. Type: New Caledonia, Balansa 3279 (P, photo BRI).

*Melaleuca cunninghamii* Schau. var. *glabra* C. T. White, J. Arnold Arb. 23: 87 (1942), syn. nov. Type: Tarara, Papua, Brass 8485 (holotype, BRI; isotypes, A, K, LAE).

#### MISAPPLIED NAMES:

*Melaleuca leucadendron* (L.) L. var. *viridiflora* (Sol. ex Gaertn.) Cheel in Ewart & Davies, Fl. North. Territ. 299 (1917); non *M. viridiflora* Sol. ex Gaertn.

*Melaleuca leucadendron* (L.) L. var. *lanceifolia* (Turcz.) F. M. Bail. Syn. Qd Fl. 170 (1883); non *M. lanceifolia* Turcz.

Tree to 25 mm high, sometimes flowering as a shrub of 1 m, with a dull green or slightly yellowish green crown and spreading to shortly pendulous twigs. Bud-scales densely shortly silky to glabrous. Young shoots densely silky with hairs 0.25–2 mm long, appressed on the leaves, ascending on the twigs. Leaves at length glabrous or the petioles puberulous; petioles compressed, 4–10 mm long, 1.5–2.5 mm wide; blades coriaceous, stiff, lanceolate to oblanceolate, straight or oblique, rarely slightly falcate, acute or narrowly obtuse, gradually narrowed to the petiole from near or somewhat above the middle, mostly 5–9 cm long and 0.6–2.4 cm wide, mostly 4–6, rarely 3 or 7 times as long as wide, 5-nerved or rarely 3- or sub-7-nerved with the nerves 0.3–0.45 mm wide, reticulations not very distinct, the glandular dots often quite obscure. Spikes solitary or 2–3 together, terminal, sometimes one in the uppermost 1–3 axils, 4–8.5 cm long, 2.5–3.5 cm wide, dense-flowered; axis 1.1–1.8 mm wide, sparsely to densely hairy with spreading hairs up to 0.7 mm long or almost glabrous. Flowers nearly always white or creamy white, rarely somewhat greenish, very rarely red or partly red. Calyx 3–4 mm long; tube subcylindrical, wrinkled when dry, 2–2.5 mm long, 2–2.6 mm wide, with short  $\pm$  spreading hairs or glabrous, sparsely pubescent to glabrous inside; sepals 1–1.8 mm long and slightly wider, thick and glandular in the lower part and there glabrous or nearly so inside and out or appressed pubescent inside at base, with a broad scarious margin 0.4–0.5 mm wide glabrous except for the ciliolate edge. Petals obovate-spathulate with a short broad claw and a suborbicular lamina, (2–) 3–3.5 mm long 2–2.5 mm wide, ciliolate otherwise glabrous, with 5 slender nerves and linear and elliptic glands. Stamens 6–9 in each bundle, the bundle 11–20 mm long; claw about 1.5–2 mm long; anthers oblong elliptic to suborbicular, 0.6–0.8 mm long. Fruit broadly cylindrical, about 3.5–4 mm long, and 4–5 mm wide with a thick wall and somewhat exserted valves. Figs. 3, 14 C, 15 C.

NEW GUINEA.—WEST NEW GUINEA: Merauke, 5 m, Oct. 1953, *Versteegh B.W.56*. PAPUA: Western Division: Strickland R., in 1885, *Bäuerlen*; Fly R., Nov. 1885, *Bäuerlen* 575, 580; Tumbuke, Wassi Kussa R., Dec. 1936, *Brass*, 8480; Penzara, between Morehead and Wassi Kussa Rivers, Dec. 1936, *Brass* 8478; Tarara, Wassi Kussa R., Dec. 1936, *Brass* 8485.



Eastern Division: Sewataitai, Normanby I., 20 m, Nov. 1956, *Brass* 28836; Seymour Bay, Fergusson I., Feb. 1884, *MacGregor*; Iamelele No. 1, Fergusson I., 15 m, May 1956, *Brass* 25983; Mapamoiwa, Fergusson I., 20 m, Nov. 1953, *Brass* 25165, 25166; Deidei, Fergusson I., 20 m, July 1956, *Brass* 27329, 27330; Misima I. (Louisiade Archipelago), June 1948, *Womersley* in *NGF*. 2776; Tutubia, Misima I., 20 m, Aug. 1956, *Brass* 27680.

QUEENSLAND.—COOK DISTRICT: Thursday I., *F. M. Bailey* 2, 17; near "Lockerbie", Nov. 1962, *Hyland* 2496; summit of Mt. Tozer, 540 m, July 1948, *Brass* 19477; Silver Plains Stn., E. of Coen, Nov. 1956, *Webb* 3180; near Archer Point, about SSE. of Cooktown, Feb. 1958, *Blake* 20246; c. 6 miles N. of Mossman,  $\pm$  24 m, July 1962, *Hoogland* 8520; near Trinity Beach near Cairns, Feb. 1958, *Blake* 20284; Cairns, Jan. 1918, *White*, May 1962, *Blake* 21732; Yarrabah, June 1918, *Michael* 496. NORTH KENNEDY DISTRICT: Rockingham Bay, Feb. 1864, *Dallachy*, June 1865, *Dallachy*; estuary of the Burdekin, *Fitzalan*. PORT CURTIS DISTRICT: Middle Percy I., *Tryon*; [Townshend I.], Aug. 1802, *R. Brown*; Byfield, Sept. 1931, *White* 8178; Rockhampton, July 1920, *White*; near Rockhampton, Mar. 1863, *Dallachy* 403; Curtis I., April 1962, *Macnae*, *Qd Nats. Club*; Boyne I., July 1920, *White*; Bustard Head, in 1770, *Banks & Solander*; Baffle Creek District, Apr. 1920, *White*; Rosedale, *Dovey* 87, 88, 85 (in part), 89, 90, 91, 93, 94. WIDE BAY DISTRICT: Fraser I., May 1919, *Petrie* 100, Dec. 1919, *Epps* 100, May 1921, *S. A. White*, Oct. 1930, *Hubbard* 4625; Bingera, near Bundaberg, Oct. 1948, *Smith* 4145; NNE. of Childers, 12 m, May 1954, *Coaldrake QCC*. 345; Burrum, *Penfold*; Traviston, Oct. 1929, *White* 6384; Dundowran (NNE. of Maryborough), July 1928, *Bromley*; near Maryborough, Apr. 1954, *Blake* 19262, June 1954, *Fielding*; Maryborough, March 1909, *Maiden*; near Tuan Forest Station (near and about SE. of Maryborough), Apr. and Oct. 1952, *Hills* in *QFD* 53/111; Gundiah, *Kajewski*; between Mary R. and Urah Ra., June 1959, *Ridley QSC*. 261; Lake Cootharaba, *Keys* 60; Boreen Point, Lake Cootharaba, Apr. 1954, *Blake* 19280; near Tewantin, May 1957, *C. L. Wilson* 647. MORETON DISTRICT: Cooloom, Apr. 1938, *White* 11418, July 1953, *Blake* 19210, 19211, May 1957, *Blake* 20111, *C. L. Wilson* 614; Nambour, June 1912, *Kenny*; near Maroochydore, April 1916, *White*; Mooloolah Heads, Apr. 1911, *White*; Glass House Mountains, July 1930, *Hubbard* 3353; Beerwah, May 1951, *L. A. S. Johnson* 290; Beerburum, Apr. 1952, *Perkins B* in *QFD*. 53/1; Elimbah, Sept. 1926, *White* 3243; between Conondale Range and Woodford, May 1957, *C. L. Wilson* 662; near Caboolture, Aug. 1959, *Everist*; Lawnton, Apr. 1931, *Blake* 2394; Strathpine, Apr. 1955, *Blake* 19789; Samford, Jan. 1930, *Meebold* 7983; Brisbane and suburbs, *Dietrich*, *F. M. Bailey*, July 1843, *Leichhardt*, Dec. 1862, *Dallachy*, June 1903, *F. M. Bailey*, Oct. 1887, Sept. 1888, June 1910, July 1910, *Simmonds*, Mar. 1907, *White*, June 1910, *White*, Mar. 1931, *White* 7630, July 1930, *Hubbard* 3441, Feb. 1931, *Blake* 2276, Aug. 1948, *Blake* 18180, 18181, Mar. 1950, *Blake* 18476, May 1952, *Blake* 18949, 18950, June 1952, *Blake* 18951, 18952, Mar. 1958, *Everist*, Feb. 1960, *Williams*; Ipswich, *Nernst*; 6 miles SE. of Ipswich, June 1957, *Pedley*; Wellington Point, June 1930, *Hubbard* 2958; Cleveland to Redland Bay, June 1951, *L. A. S. Johnson* in *NSW*. 20052; Palm Beach, Nov. 1929, *White* 6575; mouth of Currumbin Ck., Nov. 1929, *White* 6503; Moreton I., Aug. 1855, *Mueller*, Sept. 1887, *Prentice* in *hb. Simmonds*; Stradbroke I.—Amity Point, Apr. 1930, *Hubbard* 2325; between Amity Point and Point Lookout, Apr. 1930, *White* 6736, *Hubbard* 2306; Point Lookout, Apr. 1935, *Goy*; Myora, Apr. 1917, *White*; Stradbroke I., without further locality, Apr. 1917, *White*.

NEW SOUTH WALES.—NORTH COAST: Tweed Heads, Sept. 1916, *Cheel*; Pottsville, Feb. 1961, *Caulfield & Trapnell*; Byron Bay, Aug. 1916, *Boorman*; Richmond R., *Henderson*; Wyrallah, Richmond R., Apr. 1891, *Bäuerlen*; Casino, *McAuliffe* 1, 2, 4, July 1925, *Cheel*; Broadwater, Sept. 1916, *Cheel*; Woodburn to Evans Head, Sept. 1926, *Cheel*; Evans Head, Oct. 1939, *Cheel*; Angourie, July 1927, *Cheel*; Clarence R., *Beckler*; Orara R., Sept. 1916, *Cheel*; Orara R., 10 miles S. of Ramornie, July 1922, *Blakely & Shireess*; Woolgoolga, *Swain* 53; Coff's Harbour, Oct. 1930, *White* 7428; Bellingen R. district, Mar. 1910, *Swain* A.53; Nambucca Heads, June 1910, *Boorman*; Macksville, July 1928, *Cheel*; Telegraph Point, Wilson R., May 1915, *Maiden*; Port Macquarie to Kempsey, July 1895, *Maiden*; Port

Macquarie, Jan. 1918, *Penfold*, Jan. 1912, *Irby*, Mar. 1914, *Laseron*; Hastings R., *Beckler*; Kendall, June 1915, *Boorman*; Laurieton, Nov. 1915, *Boorman*; Tuncurry, May 1925, *Cheel*; Port Stephens, May 1912, *Boorman*; Raymond Terrace, May 1918, *Cheel*; Newcastle, July 1901, *Cabbage* 448; Lake Macquarie, Apr. 1915, *Clarke*; Swansea, Lake Macquarie, Jan. 1918, *Lucas & Hamilton*. CENTRAL COAST: Wyong, Apr. 1899, *Hamilton*; Lake Munmorah via Wyong, May 1950, *B. Cunningham*; Gosford, July 1888, *Fletcher*; Terrigal, Dec. 1911, *Irby*; Woy Woy, May 1915, *Cannon*; Manly, June 1883, *Maiden*, Apr. 1916, *Ellen* 122, June 1916, *Hamilton*, Dec. 1886, *Deane*; Parramatta, *Woolls*; Sydney (Port Jackson), Apr. 1793, *Née* (figure), *R. Brown*, *A. Cunningham*, *Sieber* 319, *Siemssen* 241; Rose Bay, Port Jackson, in 1844-6, *Verreaux* 586, May 1897, *Maiden*, July 1898, *Cheel*, Apr. 1900, *Helms*, July 1913, *Laseron*; South Head Road, Mar. 1887, *Weber*; Bondi, Dec. 1911, *Irby*, Apr. 1917, *Blakely*; Botany, Mar. 1888, *Fletcher*.

NEW CALEDONIA.—[Near Harcourt B.], *Forster*, *Labillardière*; Balade, *Vieillard* 451; near Tiebaghi-Nehoué, May 1951, *Guillaumin* 13358; between Moméa and Houailou, Dec. 1952, *Everist*; middle valley of the Voh, Apr. 1951, *Guillaumin & Baumann* 12485, 12487, 12488; NW. of La Foa-Canala Road, 750 m, Nov. 1949, *MacDaniells* 2337; Petit Coulée, 100 m, Nov. 1949, *MacDaniells* 2062; N. of Conception, near Nouméa, Oct. 1868, *Balansa* 99; near Yahoué, 100 m, Oct. 1902, *Schlechter* 15016; Mont Mou, 100 m, Mar. 1949, *Lam* 7257; 2 miles SE. of Nouméa, Mar. 1940, *Taylor* 81; Anse Vata, 25 m, Jan. 1950, *MacDaniells* 2558; Nouméa, June 1906, *Gandoger*, Feb. 1951, *Little*, Oct. 1923, *White*; near Nouméa, coll.?; La Coulée, 5 m, Oct. 1954, *McKee* 1063; near mouth of Rivière des Pirogues, Oct. 1923, *White* 2266; Mont Dore, 40 m, Jan. 1951, *Guillaumin & Baumann* 9912; Baie du Sud, in 1903, *Le Boucher in Cribb* 1539; Ile des Pins, June 1951, *Baumann* 13858; without definite locality, *Compton* 15; *Vieillard* 450, *Balansa* 3279, in 1850 *Moore*, in 1886 *Roberts*, in 1887 *Hodgson*, in 1903, *Rossiter*, June 1926, *Welch*, Nov. 1929, *Olle*, Sept. 1944, *Busch*.

NORTH AMERICA.—FLORIDA: Lake Childs, Aug. 1960, *Brass* 32742.

SOUTH AMERICA.—BRITISH GUIANA: Rockstone, July 1921, *Gleason* 482. FRENCH GUIANA: Between Kourou and Sinnamary, 5 m, Sept. 1963, *McKee* 10735.

CULTIVATED, origin not stated.—Sydney Botanic Gardens, *Cheel*, Apr. 1915, *Cheel*. Hong Kong, Apr. 1928, *Tsiang Ying* 187. Taiwan: Taihoku, July 1933, *Sasaki*. Hawaii: Oahu, near Palikea, Nov. 1935, *Degener & Kwan Park in hb.* *Degener* 11014; Pupukea, Sept. 1950, *Degener & Hathaway in hb.* *Degener* 20721; Manoa Valley, Jan. 1927, *MacDaniells* 230; Koolau Range, Kipapa Gulch, Oct. 1938, *Niona*. California: Santa Barbara, Oct. 1915, *Bradbury*; Los Angeles, Dec. 1960, *Griffiths* 4032; Claremont, Oct. 1960, *Griffiths* 3833b, Jan. 1961, *Griffiths* 4097; San Marino, Jan. 1961, *Griffiths* 4104; Pasadena, Jan. 1961, *Griffiths* 4050, 4051, 4052, 4053, *Griffiths & Woolley* 4063, 4064, 4065, 4066; San Diego, Mar. 1919, F.G.W. 4131. Florida: Mt. Dora, Jan. 1956, *Sheehan*; Miami, S.P.I. 24166, Sept. 1913, *Tidestrom* 4167, Dec. 1924, *L. H. & E. Z. Bailey* 6086, May 1916, *Poponoe* 310; Palm Beach, Jan. 1940, *Seibert* 1426; Coconut Grove, Nov. 1916, *Lightfoot*, Apr. 1936, *MacDaniells*; Aug. 1949, *Dress* 1121. Porto Rico: Rio Pedras, Oct. 1963, *McKee* 10595. Senegal: Hann, Aug. 1950, *Berhault* 399; Dakar, Sept. 1946, *Roberty* 6012; Kindiu, *Roberty* 17805. Uganda, *Snowden* 1815. Madagascar, Majunga, Aug. 1912, *Kaudern*.

This species is widely spread in eastern Australia near the coast from Sydney northwards, in New Caledonia, and Papua (fig. 18), commonly occurring—as usual with members of the genus—as pure communities in swampy ground but frequently on hillsides, usually where the ground water is close to the surface; on Fergusson I., Papua, it grows on the edge of hot springs and also dominates the ridges in the thermal area (*Brass* 27330, 25983). It is distinguished by the following combination of characters: stiff leaves of medium size with the main veins about 0.4–0.45 mm broad, spikes with an indumentum of  $\pm$  spreading rather

stiff-looking somewhat flexuose hairs, sepals with broad thin glabrous margins, petals with linear glands, and medium-sized anthers. The indumentum on the rhachis and calyx is very variable in density, sometimes nearly absent. Red-flowered trees seem to be extremely rare, being represented by only three of the above cited collections namely *Brass* 8478 from Papua, one of Bromley's collections from Dundowran, Queensland, and *Vieillard* 451 from New Caledonia. *Blake* 19210 from Coolum, Queensland, has some of the flowers with sepals, petals and base of the stamens red or pink. Red sepals and petals occur in other collections. Plants in flower or fruit 1 m high or less are represented by *Balansa* 99 (28 cm) and *Guillaumin & Baumann* 12383 from New Caledonia, *Keys* 60 (40 cm), *White* 11418, *Blake* 20111 and *Blake* 18476 from Queensland, and *Brass* 27330 from Papua. The last-mentioned, *Brass* 27329, *Brass* 25983 and B  uerlen's specimens from Papua have leaves thinner than usual with very prominent veins especially the secondary and tertiary ones; some leaves on B  uerlen's specimens are almost 3-nerved with the midvein slightly thicker than the laterals. *Dovey* 87 from Rosedale, Queensland, has some leaves long, narrow and falcate up to 15 cm long and 2 cm wide with petioles up to 12 mm long though not more than 2 mm wide; *White*'s specimens from Baffle Creek also have narrow leaves. *Brass* 19477 has petals hairy along the middle on both sides. In Melbourne, mounted on the same sheet, are specimens collected by R. Brown corresponding to the descriptions in his MS. of "No. 33 spec." and "No. 32 spec.", both from "Shoal Bay Passage III, Aug. 28, 1802"; the former, in fruit, is *M. quinquenervia*; the latter, in flower, is *M. nervosa*. There is a slip with "*Melaleuca* (East Coast)" in Brown's writing and two slips with "*Melaleuca leucadendron* var." in Oliver's writing.

*M. quinquenervia* is often called broad-leaved tea-tree in south-east Queensland but farther north this name is more appropriately applied to *M. viridiflora*. It is often called merely tea-tree or paper-bark and in New South Wales, Belbowrie has been applied to it. Flowering takes place in Australia chiefly in the months February–July; in New Guinea it may be in December and in New Caledonia it has been recorded for nearly all months.

*Metrosideros quinquenervia* was based on a specimen from near Sydney collected by N  e in April 1793 (Malaspina Expedition). The type should be at Madrid, but appears to have been lost. The excellent figure of Cavanilles, of which I have a copy through the courtesy of Dr. C. G. G. J. van Steenis leaves no doubt as to the identity of the plant. The species was early confused with *M. viridiflora* by those who regarded the latter as distinct from *M. leucadendron* (Smith, Trans. Linn. Soc. London 3: 275 (1797), Willd. Sp. Pl. 3: 1429 (1803), R. Br. in Aiton, Hort. Kew ed. 2, 4: 410 (1812)) the two being treated as identical. Cheel, loc. cit., identified the species with *M. viridiflora* when he made the combination *M. leucadendron* var. *viridiflora*, and the interpretation was followed by C. T. White (J. Arnold Arb. 23: 89 (1942)). The typification of *M. viridiflora* is discussed under that species. *Metrosideros coriacea* Poir., the basionym of *M. leucadendron* var. *coriacea*, was based on a Labillardiere specimen from New Caledonia in herb. Desfontaines now at Florence, though in the protologue the locality is given as New Holland; a photograph of the holotype is at Brisbane and there is an isotype

at Melbourne. It was described independently of *M. coriacea* Salisb. which was based on a specimen or plant collected by David Burton at Port Jackson and described in a few words without reference to flower or fruit. No type or drawing can be found at Kew or the British Museum, and Salisbury himself wrote "*Eucalyptus capitellata*" opposite the name in his own copy of the Prodrum (Tindale in litt.). His description of ovate-lanceolate strongly coriaceous leaves without reference to the characteristic venation of the *Melaleuca* agree better with that of *Eucalyptus capitellata* and Salisbury's own later identification should be accepted.

*Metrosideros albida* Sieb. first appeared on the labels to Sieber, Fl. Nov. Holl. 319. It was cited by Sprengel as a synonym of *Metrosideros coriacea* "Labill." (*M. coriacea* Poir. would be intended) and by De Candolle as a synonym of "*Melaleuca viridiflora* Gaertn.", to which *Metrosideros coriacea* Poir. non Salisb. was also referred, but there is no reference to Sprengel's work. Being published only in synonymy, it is an invalid name. Cheel, loc. cit., accepted the name for plants growing near Sydney which he regarded as being varietally distinct from those growing further north and derived his name *M. leucadendron* var. *albida* from it. With this he identified *M. sieberi* Schau. and *M. smithii* R. T. Baker, and the validity of the trinomial rests on the reference to these names, the remarks on the following page and the phrases in the key on p. 295. *M. sieberi* is a very different species (p. 60) and *M. smithii* is discussed below. Cheel's distinctions between *M. leucadendron* var. *albida* and what he called *M. leucadendron* var. *viridiflora* (= *M. quinquenervia*) are not reliable; those given in the key on p. 295 are incorrect as to flower colour and nervature of the leaves and are not in accord with the few remarks on p. 302. *M. leucadendron* var. *albida* f. *ruscifolia* Cheel, loc. cit. 302 was based on specimens of a very different species described elsewhere in this paper as *M. arcana* (species No. 10).

*Melaleuca leucadendron* var. *lancifolia* F. M. Bail. must have been based nomenclaturally on *M. lancifolia* Turcz. (see footnote in the discussion on *M. leucadendron*) but Bailey's remarks leave no doubt that he had *M. quinquenervia* in mind, though he may also have wished the name to cover *M. nervosa* particularly as he mentioned greenish flowers (see above under *M. cajuputi*).

*Melaleuca maidenii* and *M. smithii* were based primarily on alleged differences in the oil content of the leaves. The first reference to these names is in a joint paper by R. T. Baker & H. G. Smith in J. & Proc. Roy. Soc. N.S.W. 47: 199 (Feb. 1914) with a reference to Proc. Linn. Soc. N.S.W. "1913", but the part in which the species were described was not published until March 1914. On p. 201 is the passage: "*M. maidenii*, R.T.B. *M. leucadendron* var. *lancifolia*, Bail.—Casino, Port Macquarie, Brisbane and well north." It can hardly be said that the mention of Bailey's name validates the publication of *M. maidenii*. Baker and Smith certainly did not intend to introduce a new name in this paper; they referred to the place where the species was formally described. On p. 202 they stated that the name was proposed for the form "known in Queensland as *M. leucadendron* var. *lancifolia*" but on p. 201 *M. lancifolia* was listed as a different species.

In Proc. Linn. Soc. N.S.W. 38: 598–601, pls. 25–26 (March 1914) R. T. Baker formally described and figured *M. maidenii* and *M. smithii* without mentioning *M. leucadendron* var. *lancifolia*. No types were mentioned, only some localities. In herb. Sydney and herb. Technological Museum are some specimens sewn on stout card in the way that Baker was accustomed to prepare specimens for exhibition at meetings of the Linnean and Royal Societies of New South Wales (according to personal communication, J. L. Willis, Museum of Applied Arts and Sciences, formerly Technological Museum). There are discrepancies between the Latin and English descriptions and between these and the plates, and no specimen that could have been available to Baker prior to 1914 has been found that entirely agrees with any of the descriptions or the figures.

There are two mounted sheets written up by Baker, one marked “sp. nov.”, both with the locality “Port Macquarie” (a locality mentioned in both papers). They agree fairly well with one another and with a sheet (NSW.20073) labelled “Port Macquarie to Kempsey” collected by J. H. Maiden in July 1895. The part of the label bearing locality, date, and collector’s name appears to have been cut from an old Technological Museum label and is pasted on a Sydney Herbarium label. These specimens have shorter and relatively much wider leaves than those shown in the figure and these again are either much shorter or distinctly wider than those described. However, as the leaves described are far too narrow (4–5 in. x  $\frac{1}{2}$  in.) for any member of the group known from the localities cited, it is evident that there must be an error here. Under the circumstances, one of the sheets from Port Macquarie (NSW.20065) must be selected as lectotype.

*M. smithii* was described as having the axis glabrous or with a few rust-coloured hairs, 3–5-nerved, generally 3-nerved leaves, and staminal bundles united in a ring. The four localities cited—Rose Bay, Bondi, Gosford and Terrigal—are from the Central Coast of New South Wales. There is only one specimen mounted for exhibit and it bears no locality name. Baker mentioned that “The Gosford and Terrigal leaves are smaller, thinner and narrower than the Sydney ones.” I have seen specimens that could have been examined by Baker from all these localities. All leaves are more or less distinctly 5-nerved, though in some the outermost pair is very close to the margin. The axis, like that of all flowering specimens of the group seen from New South Wales, is very definitely pubescent with white hairs. Whether the staminal bundles are united at the base or not appears to be quite fortuitous. The specimens from Bondi and Terrigal are in fruit only and may be excluded from consideration in typifying the name. There are four collections from Rose Bay; Laseron’s specimen in Hb. Tech. Mus. match the exhibit sheet more closely and the leaves look more like those figured than do the others. For these reasons the exhibit sheet is believed to be part of Laseron’s Rose Bay collection (7.vii.1913) and is accepted as the lectotype. Baker stated that *M. maidenii* and *M. smithii* differed from one another and from other members of the group in the shape, length and texture of the leaves, in the inflorescence and in the chemical constituents, but only chemical differences are

detailed; and these differences were not recognized by Penfold and Morrison in the account of their more extensive investigations in Gunther, *The Essential Oils* 4: 535 (1950) though there is a form with no cineole.

It may be pointed out that *Metrosideros quinquenervia*, *Metrosideros albida*, and *Melaleuca smithii* were all based on specimens from the neighbourhood of Sydney.

Specimens from New Caledonia are quite like those from Australia and show comparable variation, except that the axis and calyx seem to be constantly hairy. They have generally been referred to *M. leucadendron* (Guillaumin, *Ann. Mus. Col. Marseille* 19: 72 (1911) and later works, C. T. White, *J. Arnold Arb.* 7: 97 (1926)) or to *M. viridiflora* (Brongniart & Gris, *Bull. Soc. Bot. France* 11:183 (1866) and Schlechter, *Bot. Jahrb.* 39: 208 (1906)) although the younger Linnaeus described *M. leucadendron* var. *angustifolia* from a Forster specimen from New Caledonia. *M. rubriflora* Vieill. was published as a synonym of *M. viridiflora* var. *rubriflora* Brong. & Gris. The type of these two names and of *M. leucadendron* var. *rubriflora* (Vieillard 451 (P)) has rather narrow leaves (about 6–7 times as long as wide), rather slender rhachis (1–1.1 mm thick) and red flowers. According to Guillaumin (in litt.) this red-flowered form seems to be very rare in New Caledonia.

*M. leucadendron* f. vel var. *latifolia* Guill. was based on a specimen with leaves 2.4–3.6 times as long as broad quite like several Queensland specimens. Guillaumin overlooked the earlier use of the trinomial by the younger Linnaeus and Rivière.

The type of *M. leucadendron* var. *nana* consists of two coppice shoots in fruit about 28 cm high from a much older stump. The trinomial was first cited (as a *nomen nudum*) by Guillaumin in *Ann. Mus. Col. Marseille* 19: 73 (1911).

*Melaleuca leucadendron* var. *angustifolia* L. f. was based on a specimen in herb. Bäck, collected by Forster in New Caledonia (see Juel, *Svensk. Linné-Sällsk. Årsskr.* 7: 78–9 (1924)), now in the Herbarium of the Linnean Society, London (Savage, *Catal. Linn. Herb.* 136 (1945)) with a photograph at Brisbane. Forster (*Prodr.* 38 (1786)) referred his specimen to *M. leucadendron* with the query *a latifolia?*

The type of *Melaleuca cunninghamii* var. *glabra* C. T. White is glabrous except for a sparse pubescence on the young bud at the end of the inflorescence, the petiole, the inside of the sepals at the base and inside the calyx-tube. Most of the few leaves are broader than usual, up to 10.5 cm long and 3.9 cm wide with petioles up to 1.5 cm long and they resemble those of *M. viridiflora* except for the slender petioles, but the other characters are those of *M. quinquenervia*. Brass 8478 is very similar except for its red flowers, but was not associated with it by White. The Queensland plants associated with it by White are states of *M. viridiflora* (see under that species).

4. *Melaleuca viridiflora* Sol. ex Gaertn. Fruct. 1: 173, t. 35 (1788). Type: [Queensland, Endeavour River, July-August 1770] *Banks & Solander*; holotype not located, figured by Gaertner, loc. cit.; isotypes BM (photo in NSW, BRI), NSW, MEL, W.

*Melaleuca cunninghamii* Schau. in Walp. Repert. Bot. Syst. 2: 927 (1843). Type: Australia, Endeavour River, *A. Cunningham*; holotype not located; isotypes K.

*Melaleuca leucadendron* (L.) L. var. *latifolia* Rivière, Bull. Soc. Nat. Acclim. France III, 9: 537, fig. 1 (1882), non L. f. (1781), *syn nov.* Type: Gulf of Carpentaria [*Mueller*]; syntypes, P, photos BRI, K; isosyntype, MEL.

*Melaleuca leucadendron* (L.) L. var. *cunninghamii* (Schau.) F. M. Bail. Syn. Qd Fl. 171 (1883); (Schau.) Cheel in Ewart & Davies, Fl. North. Territ. 297 (1917). Based on *Melaleuca cunninghamii*.

*Melaleuca leucadendron* (L.) L. var. *viridiflora* (Sol. ex Gaertn.) Cheel in Ewart & Davies, Fl. North. Territ. 299 (1917). Based on *Melaleuca viridiflora* but misapplied to *M. quinquenervia* (Cav.) S. T. Blake.

*Melaleuca leucadendron* (L.) L. var. *sanguinea* Cheel in Ewart & Davies, Fl. North. Territ. 296 (1917), *syn nov.* Based on *Melaleuca sanguinea*.

*Melaleuca sanguinea* Sol. ex Cheel in Ewart & Davies, Fl. North. Territ. 296 (1917) *pro syn.* Type: [Queensland: Endeavour River, July-Aug. 1770], *Banks & Solander*; holotype NSW; isotypes BM (photos in BRI, NSW), MEL, P, W.

*Myrtoleucodendron viridiflorum* ([Sol. ex] Gaertn.) O. Kuntze, Rev. Gen. Pl. 1: 241 (1891). Based on *Melaleuca viridiflora*.

Tree, commonly dwarfed, twisted and about 3–7 m high, sometimes becoming tall and straight up to 18 m, with dull green to silvery crown, the smaller branches and twigs usually stiff and short, longer and  $\pm$  pendulous on tall trees. Bud-scales partly silky-hairy to glabrous. Young shoots closely silky with fine straight appressed hairs 0.15–0.6 (mostly 0.2–0.5) mm long. Leaves finally glabrous except for the petioles, not gland-dotted, petioles compressed, (4–) 7–15 (–20) mm long, 2–5 mm wide, straight; blades very stiff and thick, narrowly to broadly elliptic or  $\pm$  obovate, or somewhat lanceolate, obtuse or  $\pm$  acute, sometimes rather abruptly narrowed to the petiole from about the middle, usually straight and  $\pm$  symmetrical, 6–15 (–22) cm long, 2.5–6 cm wide, 2–6 (–6.5) times as long as wide, 5–7-nerved with the veins 0.3–0.5 mm wide, the cross-veins conspicuous. Spikes 1–3 together, mostly terminal, mostly 7–10 cm long, 4–6 cm wide, dense-flowered; axis whitish silky with appressed hairs, 1.5–2.5 mm thick. Flowers commonly greenish white to white or pale greenish yellow but frequently red to crimson. Calyx  $\pm$  4.5–5.5 mm long,  $\pm$  silky or rarely glabrous; tube slightly widened upwards, sometimes as wide as or wider than long, 2.3–3.5 mm long, 2–3 mm wide, silky-pubescent rarely  $\pm$  glabrous outside, glabrous within;



sepals nearly semicircular 1.2–2 mm long, 2–3 mm wide, thick, glandular and nerved in the middle lower part and there silky outside and inside with broad  $\pm$  hyaline margins 0.3–0.6 mm wide, glabrous except for the ciliolate edges. Petals obovate-spathulate with a short broad claw and a suborbicular concave ciliolate lamina with 5–9 much branched nerves and linear and elliptic glands, in all about 4–5 mm long and 3.2–4.5 mm wide. Stamens 8–10 in each bundle, the bundle about 18–23 mm long, the claw 1.5–5 mm long; anthers elliptic-oblong or oblong 0.6–1.2 mm long. Fruit about 3.5–5 mm long and 4.5–7 mm wide. Figs. 4, 14 D and DD, 15 D.

NEW GUINEA.—WEST NEW GUINEA: Merauke, 5m, Oct. 1953, *Versteegh B.W.57, B.W.90*; Koerik near Merauke, June 1961, *Hoogerwerf 49, 50, 55*. PAPUA: Western Division: Strickland R. in 1885, *Bäuerlen*; Lake Daviumbu, Middle Fly R., Sept. 1936, *Brass 7794, 7937, 7938, 7939*; Tarara, Wassi Kussa R., Jan. 1937, *Brass 8710*; Mai Kussa in 1890, *MacGregor*; Wuroi, Oriomo R., 10–30 m, Jan.–Mar. 1934, *Brass 5695, 5714*; Oriomo R., 8° 50' S., 143° 15' E., 21 m, Jan. 1959, *White & Gray in NGF. 10387, 10393, 10420*; Oriomo R., Dec. 1950, *Jackson in NGF. 2739*; Mabaduan, Apr. 1936, *Brass 6558*; Daru I., Mar. 1934, *Brass 6036*.

WESTERN AUSTRALIA.—NORTHERN PROVINCE: Napier Broome Bay, Mar. 1910, *Hill 104*; 3 miles W. of Beagle Bay Mission, Sept. 1959, *Lazarides 6568*; King Sound in 1888, *Froggat in NSW. 20050*; May R., May 1905, *Fitzgerald 417*; 9 miles from Goody Goody, Apr. 1905, *Fitzgerald*; Camden Sound, May 1921, *Gardner 1329* (partly); Balmaningarra in 1916, *Basedow*; Karunjie Stn., Mar. 1952, *Rust 3a*; Wyndham in 1903, *Woodroffe*; Skull Creek, Aug. 1937, *Stokes 59*; 110 miles S. of Wyndham, June 1936, *Schaeffe in hb. Rodway 3291*.

NORTHERN TERRITORY.—DARWIN AND GULF DISTRICT: S. Goulburn I., in 1818, *Cunningham*; North coast of Arnhem Land, *McKinley*; S. of Danger Pt., Coburg Pen., July 1961, *Chippendale in NT. 8218*; SE. of Mountnorris B., July 1961, *Chippendale in NT. 8136*; Darwin, *Holtze*, Feb. 1920, *Allen 446*; near Darwin, June 1933, *Jacobs 15*; Howard Springs Jungle, July 1957, *Bateman*; about 12° 30' S., 131° 35–40' E., Sept. 1946, *Blake 17024*; Mary R., June 1957, *Bateman 505*, July 1957, *Bateman 2031*; N. of Oenpelli, July 1961, *Chippendale in NT. 8084*; SW. of Oenpelli, near East Alligator R., Dec., 1962, *Beens & Spence B.19*; Oenpelli, 12° 18' S., 133° 4' E., Oct. 1948, *Specht 1272*; about 12° 40' S., and 131° 25' E., Sept. 1946, *Blake 17002*; near Rum Jungle, March 1956, *Eddy*; near Mt. Finnis, 12 m, Aug. 1946, *Blake 16753*; near Margaret R., 13° 9' S., 131° 19' E.,  $\pm$  90 m, July 1946, *Blake 16399*; near (about NNW. of) Brocks Creek, 62 m, July 1946, *Blake 16381*; Port Keats, June 1952, *Keast 2*; South Bay, Bickerton I., Gulf of Carpentaria, June 1948, *Specht 630, 632*; Providence Knoll, July 1911, *Spencer*; Hodgson Downs Stn., about 15° 27' S. and 134° 5' E., 90 m, Apr. 1947, *Blake 17556*; Gulf of Carpentaria, *Mueller*. VICTORIA RIVER DISTRICT: 66 miles SW. of Katherine, June 1949, *Perry 2010*; Victoria R., *Mueller*; 20 miles NW. of Wave Hill Police Stn., June 1949, *Perry 2260*. BARKLY TABLELAND DISTRICT: 11 miles S. of Elliott, Mar. 1956, *Chippendale in NT. 1995*; 5 miles N. of Renner Springs, Sept. 1954, *Winkworth 568*; near (SSE. of) Banka Banka Stn., 18° 52' S., 134° 3' E.,  $\pm$  240 m, June 1946, *Blake 16016*; Attack Creek, May 1891, *Stirling*, July 1922, *Allen 638*; 48 miles N. of Tennant Creek, Apr. 1948, *Perry 601*; [about 19° 30' S., 132° 40' E.] July 1911, *Hill 420*; Flynn's Memorial (N. of Tennant Creek), July 1958, *Trapnell 56*; 9 miles N. of Tennant Creek, Mar. 1955, *Winkworth 1000*; near Tennant Creek, 19° 20' S., 134° 45' E., June 1946, *Blake 15987*; near (S. of) Tennant Creek, Oct. 1957, *Carter*. ALICE SPRINGS DISTRICT: [Landers Creek—about 20° 20' S., 132° 30' E.], June 1911, *Hill 403*.

QUEENSLAND.—BURKE DISTRICT: Massacre Inlet, Aug. 1922, *Brass 170*; Sweers I., *Henne*, June 1901, *J. F. Bailey*; 6 miles W. of Westmoreland Stn., June 1948, *Perry 1335*; Nicholson R., June 1963, *Gittins 823*; 51 miles N. of Lawn Hill Stn., June 1948, *Perry 1125*;

48 miles N. of Lawn Hill Stn., June 1948, *Perry* 1118; "Adel's Grove", May 1946, *de Lestang* 246, Mar. 1947, *de Lestang* 362; Doomadgee Mission, Mar. 1961, *Fawcett* 13; 3 miles E. of Normanton, Mar. 1954, *Lazarides* 4280; Gulf of Carpentaria, coll.?; Kamilaroi Stn., April 1954, *Everist* 5284; Croydon, Aug. 1913, *Cambage* 3922; 23 miles SE. of Croydon, July 1954, *Speck* 4718; SE. of Croydon,  $\pm$  170 m, July 1954, *Blake* 19579; towards Croydon from "Esmeralda", July 1954, *Blake* 19607; Saxby R., in 1948, *Docker*; near Saxby R., Aug. 1913, *Sulman* 11. COOK DISTRICT: Thursday I., [June 1897], *F. M. Bailey* 3, 4; Cape York, *W. Hill* 154; Cape York, June 1961, *Volck* 1953; "Lockerbie" 10 miles WSW. of Somerset, 20 m, May 1948, *Brass* 18576, 18607; head of Cowal Ck., near Cape York, *Whitehouse*; Mt. Tozer, 100 m, June 1948, *Brass* 19027; Portland Roads, 10 m, June 1948, *Brass* 18976; Weipa, June-Aug. 1960, *Cole* 507; E. of Weipa, June-Aug. 1960, *Cole* 519; The Bend, 2 miles NNW. of Coen,  $\pm$  210 m, Oct. 1962, *Smith* 11980; Coen, coll.?; Lake Alexandria, July 1952, *Messmer*; Endeavour R., *Banks & Solander*, *A. Cunningham* 254/1819, 255/1819, *Persieh* 44; Cooktown, Jan. 1958, *Blake* 20210, 20211, 20212, Mar. 1959, *Buhmann*; Grassy Hill, Cooktown, June 1951, *Musgrave*; Bailey's Creek, Oct. 1962, *Smith* 11624; Port Douglas, Aug. 1963, *Blake* 22087, 22088, June 1960, *Trapnell* 116A; on "Wrotham Park" about 50 miles NW. of Mungana, Apr. 1938, *Blake* 13710, 13711; 17 miles E. of Chillagoe, June 1955, *Tracey & K. J. White* 5356; near Chillagoe, 315 m, Apr. 1938, *Blake* 13565; Mt. Molloy, 360 m, Apr. 1932, *Brass* 2489, 2494; near Mt. Molloy, Aug. 1948, *Smith* 3905; 7 miles on Chillagoe Railway, June 1929, *Tardent* 177; Alma-den, 480 m, Aug. 1913, *Cambage* 3867; near Dimbulah, Dec. 1955, *K. J. White* 1263; Horse Creek, Dimbulah, June 1929, *Tardent* 178; Bibbohra, Oct. 1915, *Martion in hb.* *Cambage* 4158; Parish of Tinaroo, Apr. 1923, *Fraser* F.26, F.29; Kambul near Marceba, Feb. 1922, *White* 1509; Mt. Abbott, SW. of Mareeba, May 1962, *Keefer* 162; Cairns, Jan. 1918, *White*; near Cairns, May 1962, *Blake* 21782; Meringa, Jan. 1921, *Dodd* 52, *Illingworth*; Mulgrave R., *Bailey*; Stannary Hills, *Bancroft* 32; St. Ronan's Station, Mt. Garnet, Dec. 1960, *Myers*; 6 miles NE. of Strathmore, Aug. 1953, *Perry* 3921; Frewhurst, Feb. 1922, *White* 1369; Cumberland, May 1937, *Brass* 8809; "Forest Home", Gilbert River, Feb. 1922, *White* 1377, 1378. NORTH KENNEDY DISTRICT: SW. of Herberton, junction of Cooloomon and Little Cooloomon Creeks, May 1962, *Whitehouse*; Ravenshoe to Tully Falls, July 1952, *Messmer*; Rockingham Bay, May 1867, *Dallachy*; Rockingham Bay, on road to Dalrymple Gap, May 1864, *Dallachy*; Antigua Estate, Ingham, Sept. 1903, *R. G. Johnson*; 19 miles N. of Ingham, June 1960, *Trapnell* 37; 13 miles N. of Ingham, June 1960, *Trapnell* 35B; 12 miles N. of Ingham, June, 1960, *Trapnell* 35A; Mt. Fox,  $\pm$  25 miles SW. of Ingham, Nov. 1949, *Clemens*; Palm Islands, *Bancroft* 34; between Townsville and Rollingstone, June 1955, *Beaulehole*; Mt. St. John, near Townsville, Apr. 1959, *Roff* 11; Magnetic I., Mar. 1922, *White* 1626; between Cluden and Stuart, July 1942, *Smith* T.37; Barratta Creek, about 25 miles SW. of Ayr, June 1949, *Smith* 4337; Port Denison, *Fitzalan*; Bowen district, *Young*; Proserpine, Apr. 1921, coll.?; Brampton I., Jan. 1949, *Oxenford*. SOUTH KENNEDY DISTRICT: Farleigh, June 1960, *Trapnell* 27; Mackay, *Dietrich* 379, Jan. 1952, *Robertson*; 3 miles N. of Sarina, June 1960, *Trapnell* 24; Sarina, Jan. 1931, *Hubbard & Winders* 6523; Perpetua Point, E. from Sarina, Apr. 1927, *Francis*; Koumala, May 1927, *Francis*. PORT CURTIS DISTRICT: Middle Percy I., Dec. 1905-Jan. 1906, *Tryon*; between Carmila and Flaggy Rock, May 1927, *Francis*; Yeppoon, May 1925, *Court* 40; Rockhampton, *Dallachy*, *Byerley*, *Simmons*; between Watalgan and the coast, Apr. 1920, *White*; Rosedale, *Dovey* 92. WIDE BAY DISTRICT: between Goodwood and Bundaberg, 31 m, May 1953, *Coaldrake* QCC.237; near (NE. of) Maryborough, Apr. 1954, *Blake* 19264, May 1956, *Blake* 19918, 19919, 19920; near (about SE. of) Maryborough, Apr. and Oct. 1952, *Hills in QFD.* 53/112, 53/113; near Maryborough, Apr. 1960, *Manski*.

In its usual state as a small crooked tree (fig. 14D) on ill drained slopes and flats with stiff stout twigs and large stiffly spreading prominently veined leaves, white-silky when young, this species is very easily recognized over a very wide area (fig. 19). In the more arid parts of its range, with an average annual rainfall of

about 12–15 inches (30–37·5 cm) it is found as a shrub 1–2 m high in desert scrub (Blake 16016, 15987) though similar dwarf states are found in Papua (Brass 7938, 7939). On swampy ground, especially in the Northern Territory, pure forest communities up to 18 m high occur (e.g. Blake 17024, fig. 14DD) the trees having longer narrow acute leaves curved from the petioles, though small trees may have similar leaves.

*M. viridiflora* has the largest flowers and consequently the thickest spikes as well as the coarsest leaves of the whole genus. The colour of the flowers may be greenish white to nearly white, greenish yellow, pink (Brass 7938), red, or deep crimson (Blake 19919, etc.). "Red" flowered trees are not uncommon. Glabrescent states occur (e.g. Fraser F.29, Blake 13565, Brass 8809) and where the lack of indumentum is associated with long narrow leaves (L/B up to 10) a rather distinctive facies results as shown by Blake 19607 (see below), C. T. White 1369, K. J. White 1263, Tardent 178, Keefer 162 and Bancroft 32; the form of the leaves associated with the glabrous or nearly glabrous inflorescence might suggest hybridism with *M. leucadendron* but field observations (where recorded) are against the suggestion and the texture and venation of the leaf and size of flowers are entirely those of *M. viridiflora*. Allen 446 is more suggestive of such a hybrid. Brass 8710 from trees 1·5–2·5 m high have some small leaves with petioles only 5 mm long and 1·8 mm wide and anthers only 0·6–0·7 mm long. Blake 15987 from desert scrub has the marginal band of some sepals slightly hairy. The chief flowering period is January–September.

The red-flowered form was referred to *M. leucadendron* var. *sanguinea* Cheel by Cheel, and by C. T. White in hb. Brisbane to an unpublished form of *M. cunninghamii*, but I feel sure that neither has correctly sorted the material according to the colour of the flowers when fresh. Cheel stated that the trees with green or greenish yellow flowers had leaves that were more silvery or silky hairy but I can find no such correlation.

The interpretation of the name *Melaleuca viridiflora* is based on:

- (1) Gaertner's figures;
- (2) Solander's description of *Melaleuca viridiflora* and the plate drawn from specimens collected by him and Banks in Britten, Bot. Cook's Voy. 2: 38, pl. 113 (1901);
- (3) Photographs of Banks and Solander's specimens in the British Museum (Natural History);
- (4) Some of Banks and Solander's specimens in herb. Sydney.

There has been a long-standing confusion with *M. quinquenervia*, beginning apparently with J. E. Smith (Trans. Linn. Soc. 3: 275 (1797) and continued by Willdenow Sp. Pl. 3: 1429 (1803), R. Brown in Ait. Hort. Kew. ed. 2, 4: 410 (1812) and others; usually the two species were not distinguished. Cheel referred Gaertner's name to the species *Melaleuca quinquenervia* on the grounds that the Banks and Solander specimens of this at Sydney had fruits while the specimens

at Sydney of the plant figured by Britten had no mature fruits and Gaertner figured fruits. Actually Gaertner also figured stamens, and his figures, the plate and Solander's description published by Britten, the photographs of the specimens in the British Museum\* and the specimens at Sydney all so entirely agree that there can be no doubt about the application of Solander's name published by Gaertner. Further, the usual colour of the flowers in *M. viridiflora* as understood in this paper is greenish or greenish yellow, whereas in *M. quinquenervia* it is nearly always cream to white. *M. sanguinea* is the red-flowered form of the species. *M. cunninghamii* was described from specimens from the same locality (Endeavour River) as *M. viridiflora* and *M. sanguinea*, and Cunningham's specimens at Kew showing both colour forms (254/1819 and 255/1819) are mounted on one sheet. Cunningham wrote in his MS. that he thought that both belonged to the same species and Schauer evidently agreed since he did not cite a number.

*M. leucadendron* var. *cunninghamii* was proposed by Bailey without reference to *M. cunninghamii* Schau. but there can be no doubt that the combination was based implicitly on the name (see footnote to the remark on *M. leucadendron* var. *saligna* under *M. leucadendron*). Cheel (in Ewart & Davies, loc. cit. 296) was therefore wrong in making the combination afresh and in treating Bailey's name as a synonym of *M. leucadendron* var. *sanguinea*. Bailey regarded both the red and greenish-flowered trees as belonging to the same taxon, remarking in Qd Fl. 2: 601 (1900) after *M. leucadendron* var. *cunninghamii* that "a form of the latter differs in its flowers being of a dark-red colour".

Rivière's very brief account of *M. leucadendron* var. *latifolia*, with a figure of a single leaf, refers unmistakably to *M. viridiflora*, especially to specimens (P) communicated by F. Mueller labelled by him "Melaleuca leucadendron L. var. *latifolia*" with his name as author of the trinomial on one label. ("On trouve dans certains herbiers, parmi un grand nombre de variétés, un *Melaleuca leucadendron*, var. *latifolia*, dont l'ampleur de la feuille, véritable feuille de *Dammara* par sa forme et ses dimensions, atteint et dépasse souvent 9 centimètres de long sur 3-4 centimètres de large (fig. 1). *Gulf Carpentaria*"). On p. 536 he had stated that "*M. latifolia* L.f." (should be *M. leucadendron* var. *latifolia* L.f.) was based on a broad-leaved specimen chosen from a young stem, and his name is clearly independent of that of the younger Linnaeus; the figure however is referred to *M. leucadendron* var. *latifolia* L.f. in Index Londinensis.

The type of *M. cunninghamii* var. *glabra* is a specimen of *M. quinquenervia* with petioles longer and leaves broader than usual. White referred to the variety a few Queensland collections of *M. viridiflora* with  $\pm$  falcate, acute, unusually narrow leaves (6 or more times as long as wide) with long, slender, relatively thick petioles; these specimens also have long claws to the staminal bundles but a few hairs are present on the axis close to the flowers or on the base of the calyx. Blake 19607 is a copious collection and gives the impression of a distinct species, especially as the small community from which it was gathered is not far distant

---

\* These specimens were seen in 1965.

from abundant characteristic *M. viridiflora* (Blake 19579), but all the distinctive features of the glabrous axis and calyx, the calyx tube rather longer than wide, the unusually long claw to the staminal bundles (up to 5 mm long), and the  $\pm$  falcate long narrow leaves with slender thick petioles are to be found one by one or in different combinations on specimens of otherwise characteristic *M. viridiflora*.

O. Kuntze took a very broad view of *M. leucadendron* and when he made the combination *Myrtoleucodendron viridiflorum* he intended it to be applied to the whole complex, not only *Melaleuca viridiflora* as understood in this paper.

**5. *Melaleuca dealbata* S. T. Blake; species nova, affinis *M. nervosae* (Lindl.)**

Chele a qua foliis pro more majoribus tomento pilorum crispiorum longe persistente, spicis longioribus angustioribus, staminibus pluribus brevioribus differt. Typus: Northern Territory, ca 12° 40' S., ca 131° 25' E., Blake 17000 (holotypus, BRI.044839).

Arbor magna usque ad 24 m alta cortice albedo multilamellato oblecta, indumento pilorum minorum crispiorum praeterea longiorum rectorum induta. Folia coriacea vel lanceolata vel elliptica vel admodum oblanceolata,  $\pm$  acuta, interdum falcata, plerumque 7–12 cm longa et 1.5–2.5 cm lata, circiter 4–8-ies longiora quam lata, 5–7-nervia. Spicae terminales et axillares, saepe plures in ramulis defoliatis, 7–12.5 cm longae 1.8–2.2 cm latae, laxiflorae floribus saepissime ternis; axis dense tomentosus mox excrescens. Calyx campanulatus, 3–3.5 mm longus; tubus 2–2.6 mm longus extus tomentosus, intus glaber vel fere glaber; sepala circa tertiam usque dimidiam partem tubi adaequantia, fere omnino crassa herbacea, marginibus angustissimis tenuiora, subsemicircularia, extus tomentosa ciliataque intus pubescentia. Petala latiora quam longa vix unguiculata, glandulis rotundis usque oblongis praedita. Staminum fasciculi 6–7 mm longi; filamenta in utroque fasciculo 6–9; unguis petalo brevior; antherae 0.65–1 mm longae. Ovula multa in placenta peltata sita. Fructus subcylindricus vel cupuliformis tomentosus, 3–4 mm longus latusque, valvis inclusis. Figg. 5, 14 E, 15 E, 15 N.

Tree to 24 m with a dense usually very hoary crown and shortly pendulous branchlets. Bud-scales white, densely pubescent, the upper ones with the indumentum chiefly on and near the midvein. Young shoots strongly hoary-tomentose, the tomentum usually persisting to the second or even the third season consisting of a dense felt of short, erect crisped hairs mostly 0.13–0.2 mm long and some longer,  $\pm$  straight, spreading hairs up to 0.65–0.9 mm long, the longer hairs more abundant on the twigs and chiefly marginal on the leaves where at length they wear away. Full-grown leaves closely and densely tomentose, the tomentum partly disappearing with extreme age, occasionally in the first year, finely dotted; petioles convex beneath, slightly concave above, incurved or recurved, 6–10 mm long, 1.1–1.8 mm wide; blades coriaceous, lanceolate to somewhat oblanceolate, acute or somewhat acuminate or  $\pm$  apiculate, gradually narrowed to the petiole from about the middle, straight, oblique, or somewhat falcate, mostly 7–12 cm long and 1.5–2.5 cm wide, about 4–8 times as long as wide, 5–7-nerved, the third pair of nerves, when present, close to the margin and confluent with it in the upper part, the others 0.25–0.6 mm wide, reticulations prominent. Spikes terminal and 1–4 together, also axillary, sometimes several on leafless twigs, 7–12.5 cm long, about 1.8–2.2 cm wide, loose-flowered; axis 0.9–1.65 mm

thick, densely tomentose with short crisped hairs and longer spreading hairs. Flowers creamy white. Calyx 3–3.5 mm long; tube slightly widened upwards, wider than long, 2–2.6 mm long, 2.5–3.2 mm wide, tomentose with both kinds of hairs, inside glabrous or nearly so; sepals thick and herbaceous nearly throughout, the extreme margins thinner,  $\pm$  semicircular, 0.8–1.6 mm long, 1.5–2.2 mm wide, tomentose all over outside and ciliate, pubescent inside. Petals broader than long, scarcely clawed, about 3–3.5 mm long and 3.5–4 mm wide, ciliolate, glabrous or shortly pubescent outside, with 7 slender branched veins and small round to oblong glands. Stamens 6–9 in each bundle, the bundles 6–7 mm long; anthers elliptic-oblong, 0.65–1 mm long. Fruit subcylindrical or cupshaped, tomentose, 3–4 mm long, 3–4 mm wide, with included valves, much less persistent than in all the preceding species. Figs. 5, 14 E, 15 E, 15 N.

NEW GUINEA.—WEST NEW GUINEA: Merauke, 5 m, Oct. 1953, *Versteegh B.W.* 68; Merau River, E. bank, S. of Senajo, 20 m, in *Melaleuca-Antidesma* forest, Aug. 1954, *van Royen* 4649. PAPUA: Western Division: Gaima, Lower Fly R., principal tree of savannah forests, Nov. 1936, *Brass* 8247; Daru Island, Dec. 1950, *Jackson in NGF.* 2745. Central Division: Mageri near Sogeri, Aug. 1951, *Dominey in NGF.* 4205; Koitaki, open savannah land,  $\pm$  450 m, July 1935, *Carr* 12847; near Port Moresby, *Edelfeldt* 233; Astrolabe Range, July 1918, *White* 233, 570 m, *Edelfeldt* 251, 253; Bisiatabu, dry savannah, 450 m, Nov. 1925, *Brass* 631.

NORTHERN TERRITORY.—DARWIN AND GULF DISTRICT: Near Darwin, Sept. 1942, *de Zeeuw*; bank of Howard R., 12° 28' S., 131° 5' E., 6 m, Sept. 1946, *Blake* 16949; about 12° 40' S., and 131° 25' E., dominant in *Melaleuca* forest on dark grey swampy flat, Sept. 1946, *Blake* 17000, and near edge of lagoon, Sept. 1946, *Blake* 17003; 20 miles SW. of Ooloo Stn., Aug. 1961, *Speck* 1604; Yirrkala, dominant in a hollow in coastal dune forming an open woodland, 12° 12' S., 136° 47' E., July 1948, *Specht* 1027; Mataranka, Nov. 1952, *Bateman*.

QUEENSLAND.—COOK DISTRICT: Cape York, *Daemel*; Bloomfield R., Oct. 1928, *Petrie* 4; Spear Ck., Mt. Molloy, 390 m, Aug. 1963, *Schodde* 3358; Stratford, near Cairns, seasonally swampy ground, sandy soil,  $\pm$  6 m, July 1954, *Blake* 19672. NORTH KENNEDY DISTRICT: Herbert R., *Eaton*; 16 miles from Townsville, in good swampy ground, Oct. 1905, *per Chief Engineer for Railways*; Brandon, locally dominant in swampy ground, Oct. 1950, *Blake* 18696; Macdesme, common in swamps, Nov. 1947, *Hely*; Rita Island, mouth of Burdekin R., common in swamps, Oct. 1950, *Blake* 18643; estuary of the Burdekin, *Burdekin Expedn.*; Edgecumbe B., ? *Fitzalan*; Port Denison, swamps, *Fitzalan*; Proserpine, *Michael* 706, Oct. 1934, *Macpherson in NQNC.* 770. SOUTH KENNEDY DISTRICT: Mackay, *Dietrich* 2609. PORT CURTIS DISTRICT: Byfield, common in savannah forest, Sept. 1931, *White* 8153; Yeppoon-Byfield area, Nov. 1961, *Girdier*; Yeppoon, sandy ridge in coastal forest, Apr. 1959, *Roff* 4; Coolwaters, coastal fringe, Apr. 1959, *Roff* 6; Yeppoon Road, Rockhampton, Oct. 1925, *Court* 80; Emu Park, chiefly in wet places in open forest extending to sea beach, Sept. 1943, *Blake* 15339A; Paradise Farm, Boyne R., *coll.?*; Baffle Creek district, Apr. 1920, *White*; near Oyster Creek, gritty soil, Oct. 1956, *Ridley QSC.* 53; Rosedale, *Dovey* 85A, 86. WIDE BAY DISTRICT: Fraser Island at Figtree, Dec. 1919, *Epps* 117; Fairymead, near Bundaberg, bank of waterhole, Oct. 1948, *Smith* 4147; Traviston, common in sandy soil on edge of rather brackish swamps, Oct. 1929, *White* 6383; Pialba, edge of swamps and sandy forest land, sea level, abundant, Oct. 1921, *White* 1138; near Maryborough, locally dominant on low-lying ill-drained sandy soil, Apr. 1954, *Blake* 19263; Maryborough district, *Young*; Boonaroo Plains near (E. of) Maryborough, Sept. 1953, *Coaldrake QCC.* 269.

This species is found (fig. 20) as a tall or fairly tall tree in swampy ground north of Maryborough (25° 35' S.) and rarely far from the coast except in New Guinea. In the field it is usually readily distinguished by its extremely hoary dense

crown and for this reason has been known as "soapy tea-tree" and "cloudy tea-tree"; the hoariness persists on the two or three year-old leaves in herbarium specimens. The indumentum consists chiefly of very small crisped hairs, and this with the leaf shape and small flowers, usually readily distinguish this species from all others. However, glabrescent individuals are occasionally met with, such as those represented by *Blake* 17003.

It resembles *M. nervosa* more closely than any other species, but has longer twigs, mostly larger leaves with more persistent indumentum, greater abundance of short crisped hairs in the indumentum, longer and narrower frequently axillary spikes sometimes on leafless twigs, and shorter and more numerous stamens. The indumentum is much less silky than in *M. argentea*, the leaves are broader with more prominent reticulations and the stamens are more numerous and shorter. Sometimes it has the aspect of *M. cajuputi* but the presence of crisped hairs and absence of a broad thin glabrous margin to the sepals readily distinguish it besides the usually coarser veins.

In the Melbourne herbarium a few sheets of this were written up by Mueller as a variety of *M. leucadendron*, but the epithet was never published and is no longer available for a species; it was referred to in *Essay Plants Burdekin* 7 (1860) as a "variety with grey, velvety, downy leaves, very interrupted spikes and stamens only  $\frac{1}{3}$ – $\frac{1}{2}$  inch long."

Cheel did not distinguish *M. dealbata* from *M. nervosa*. He referred some material to his concept of *M. leucadendron* var. *coriacea*, some to *M. leucadendron* var. *minor*, partly with a query, and a few specimens to *M. leucadendron* var. *sanguinea*; apparently he saw no material until after the *Flora of the Northern Territory* was published.

The chief flowering period is July–December.

6. *Melaleuca nervosa* (Lindl.) Cheel, J. & Proc. Roy. Soc. N.S.W. 78: 65 (1944); non Hort. ex Link (1822) *nomen invalidum*. Based on *Callistemon nervosus*.

*Callistemon nervosus* Lindl. in Mitch. Trop. Aust. 235 (1848) ("nervosum"). Type: Queensland, Balmy Creek, July 1846, *Mitchell* 241 (holotype, CGE not seen, photo BRI); isotypes, MEL, NSW, photos BRI, K).

*Melaleuca crosslandiana* W. V. Fitzg. Western Mail (Perth), 2 June 1906, et J. Roy. Soc. W. Aust. 3: 186 (1918). Type (lectotype): Western Australia, base of Mt. Harris, June 1905, *W. V. Fitzgerald* 1116 (NSW, BRI).

*Melaleuca leucadendron* (L.) L. var. *coriacea* (Poir.) Cheel forma *crosslandiana* (W. V. Fitzg.) Cheel in Ewart & Davies, Fl. North. Territ. 298 (1917). Based on *Melaleuca crosslandiana*.



*Melaleuca leucadendron* (L.) L. var. *nervosa* (Lindl.) Domin, Biblioth. Bot. 89: 457 (1928). Based on *Callistemon nervosus*.

*Melaleuca leucadendron* (L.) L. var.? *parvifolia* Benth. Fl. Aust. 3: 143 (1867) as to *Callistemon nervosus* Lindl.

#### MISAPPLIED NAMES:

*Melaleuca leucadendron* (L.) L. var. *coriacea* (Poir.) Cheel in Ewart & Davies, Fl. North. Territ. 297 (1917); non *Metrosideros coriacea* Poir.

*Melaleuca leucadendron* (L.) L. var. *minor* (Sm.) Cheel in Ewart & Davies, Fl. North. Territ. 299 (1917); non *Melaleuca minor* Sm.

Tree up to 10 m high but commonly 3–7 m and crooked; crown  $\pm$  glaucous, with stiff short twigs. Bud-scales shortly tomentose with minute crisped hairs and longer straight hairs, at length  $\pm$  glabrescent. Young shoots white tomentose or woolly, with long,  $\pm$  spreading somewhat flexuose hairs and also short hairs 0.15–0.55 mm long that are flexuose, particularly the smaller ones. Leaves at length glabrescent except for the petioles and then  $\pm$  shining, not dotted; petioles loosely hairy with spreading hairs or hoary, compressed, straight, 4–10 mm long, 1.4–1.6 mm wide; blades coriaceous, stiff, at length  $\pm$  shining, lanceolate to oblanceolate or narrowly obovate or elliptical, straight or oblique but hardly falcate, obtuse to acute, gradually narrowed to the petiole from slightly below to slightly above the middle, more abruptly narrowed to the tip, mostly 4–9 cm long and 1–3.7 cm wide, 2–6.3 times as long as wide, 5–7-nerved, the nerves 0.3–0.5 mm wide, the reticulations prominent. Spikes usually terminal, 1–3 together, stiff, 4.5–9 cm long, 3.3–5 cm wide, rather densely flowered; axis 0.9–1.3 mm thick, hairy with obliquely spreading,  $\pm$  flexuose hairs 0.2–1 mm long. Flowers greenish (usually) or red. Calyx densely tomentose all over outside with long and short hairs, about 2.6–4 mm long; tube slightly widened upwards, 1.8–3 mm long, 2–3.5 mm wide, tomentose outside, glabrous inside; sepals 0.8–1.2 mm long, 1–1.8 mm wide, thick, margins thinner but neither membranous hyaline nor scarious, rather long ciliate, tomentose all over outside, hoary to tomentellous inside. Petals nearly circular above a very short broad claw, 2.3–3.5 mm long, 2.2–3 mm wide, glabrous except for the ciliolate margin, 5-nerved with very fine branched veins, with a few round to elliptical or also linear glands. Stamens 3–5 in each bundle, the bundles 17–21 mm long; anthers elliptic oblong 0.6–0.9 mm long. Style 17–23 mm long. Fruit 3–4 mm long, 3–4 mm wide, shortly cylindrical to somewhat ellipsoid truncate, with included valves. Figs. 6, 14F, 15F.

NEW GUINEA.—PAPUA: Western Division: Tarara, Wassi Kussa R., Dec. 1936, *Brass* 8407.

WESTERN AUSTRALIA.—NORTHERN PROVINCE: Anna Plains Stn., 80-mile Beach, July 1941, *Burbidge* 1457; near Beagle Bay Mission, Sept. 1959, *Lazarides* 6560, 6564; Derby, July 1906, *Fitzgerald* 1566; near Derby, July, 1906, *Fitzgerald*; Fitzroy R., 10 miles above Langey's Crossing, May 1944, *Gardner* 7072; Fitzroy R., in 1881, *Forrest*, in 1894, *Calvert Expedn.*; May R., 1905, *Fitzgerald* 456; Isdell R., near Grace Knob, May 1905, *Fitzgerald*; Admiralty Gulf, July 1921, *Gardner* 1483; Mt. Harris, June 1905, *Fitzgerald*; base of Mt. Harris, June 1905, *Fitzgerald* 1116; 31 miles SW. of Kalumburu Mission, Sept. 1954,

*Speck* 4929; Kurunjie Stn., *Rust*; 11 miles NE. of Tableland Stn., July 1959, *Lazarides* 6401; Ivanhoe Stn., June 1944, *Gardner* 7407; "Ivanhoe"-Argyle", July, 1937, *Stokes* 7; 5 miles SE. of Gordon Downs Stn., July 1949, *Perry* 2467.

NORTHERN TERRITORY.—DARWIN AND GULF DISTRICT: N. of 15°, May–Sept. 1911, *Campbell*; Port Darwin, *Schultz* 417; Darwin, Apr. 1927, *Bleeser* 467; 20 miles S. of Darwin, July 1933, *Jacobs* 50; about 25 miles SE. of Darwin, Nov. 1950, *St. John* 24240; 47 miles N. of Oenpelli, July 1961, *Chippendale in NT*.8126; Oenpelli, 12° 18' S., 133° 4' E., Oct. 1948, *Specht* 1274; near Margaret R. in about 13° 6' S., 131° 22' E.,  $\pm$  30 m, Sept. 1946, *Blake* 17082; about SSE. of Brocks Creek, 13° 37' S., 135° 35' E.,  $\pm$  150 m, June 1946, *Blake* 16344; McCallum's Creek, 90 miles SW. of Darwin, July 1953, *Caulfield & R. Hill*; Maude's Creek, also Stirling Creek, July–Aug. 1911, *Spencer*; 15 miles NNE. of Maranboy, Mar. 1961, *Speck* 1626; Maranboy to Mataranka, July 1933, *Jacobs* 115; Borroloola, June–Aug. 1960, *Cole*; 88 miles N. of Top Springs Store, Oct. 1957, *Chippendale in NT*. 3877; near mouth of Foelsche R., July 1948, *Perry* 1832. VICTORIA RIVER DISTRICT: 53 miles ENE. of Carlton Stn., W. A., July 1952, *Perry* 2981; Alligator Spring, 70 miles E. of Carlton Stn., July 1949, *Perry* 2608; 35 miles SSE. of Victoria River Downs Stn., June 1949, *Perry* 2145; about 17° S., 132° E., July 1911, *Hill* 453. BARKLY TABLELAND DISTRICT: 8 miles N. of Renner's Springs, July 1956, *Forde* 244, 245; 40 miles S. of Elliott, July 1953, *Caulfield & R. Hill*; 30 miles E. of O. T. Stn., Aug. 1948, *Perry* 1869; near Tennant Creek at 19° 20' S., 134° 45' E., June 1946, *Blake* 15986; 23 miles W. of Rockhampton Downs T. O., Aug. 1955, *Chippendale in NT*.1539; 16 miles N. of Helen Springs Stn., Aug. 1948, *Perry* 1900; 53 miles NE. of Cresswell Stn., July 1948, *Perry* 1652.

QUEENSLAND.—BURKE DISTRICT: Massacre Inlet, Aug. 1922, *Brass* 169; Golden Ck., July 1923, *Brass* 362; Settlement Ck., June 1923, *Brass* 361; Westmoreland Stn., June 1963, *Gittins* 827; Gregory R., 20 miles from Burketown, July 1928, *MacGillivray* 2177; "Adel's Grove," between Camooweal and Burketown, June 1950, *de Lestang* 477; Croydon, Aug. 1913, *Cambage* 3929,  $\pm$  110 m, July 1954, *Blake* 19564; 13 miles SW. of Croydon, Aug. 1953, *Perry* 3925, 3927; Esmeralda Stn., July 1954, *Blake* 19621; near Saxby R., Aug. 1913, *Sulman* 3; Millungera Stn., Aug. 1916, *White*; 48 miles S. of Millungera Stn., Aug. 1954, *Speck* 4782; Dalgonaally Stn., April 1954, *Everist* 5333; Flinders R., *Bowman* 206, Aug. 1916, *White*. GREGORY NORTH DISTRICT: 57 miles E. of Urandangie, May 1948, *Perry* 820. MITCHELL DISTRICT: [W. of Prairie] 20 miles E. of Hughenden, June 1954, *Perry* 4523, 4524; Prairie to Baronta, Sept. 1913, *Cambage* 3964, 3967; Torrens Creek, Aug. 1933, *Chisholm*; 13 miles WSW. of Torrens Creek, June 1953, *Perry* 3596; Tiree Stn., S. of Torrens Creek, Sept. 1949, *Ford in NSW*.19973; Tower Hill Ck., Apr. 1919, *White*; 38 miles S. of Corinda Stn., June 1949, *Everist* 3876, 3877; Jericho, *NSW*.19998. COOK DISTRICT: Cape York. *W. Hill* 54; Portland Roads, 25 m, June 1948, *Brass* 19000; Wenlock, Batavia R., 150 m, July 1948, *Brass* 19673; about 15 or 16 miles SE. of Coen, Oct. 1962, *Smith* 12021; near Musgrave Telegraph Stn.,  $\pm$  120 m, Aug. 1948, *Brass* 19982; between Cooktown and Mt. Cook, Aug. 1959, *Smith* 10567; near Koah, *Tardent* 119; 2 miles W. of Rocky Creek Rwy. Stn., *Tardent* ?; Atherton, Aug. 1901, *Beiche*; Alma-den, 480 m, Aug. 1913, *Cambage* 3866; near Dimbulah, Dec. 1955, *K. J. White* 1262; about 10 miles ENE. of Mareeba  $\pm$  450 m, June 1962, *Hoogland* 8485; near Mareeba, Feb. 1958, *Blake* 20303, Parada, Sept. 1957, *Keefer*; Stannary Hills, *Bancroft* 176 and *sine no.*; 5 miles SW. of Stirling Stn., Aug. 1953, *Perry* 3948; N. of "The Lynd" Stn.,  $\pm$  550 m, July 1954, *Blake* 19484; Oak Park Stn., Sept. 1937, *Brass & White* 87. NORTH KENNEDY DISTRICT: 6 miles WSW. of Cashmere Stn., July 1953, *Perry* 3773; Townsville, July 1918, *Michael* 465; between Cluden and Stuart, July 1942, *Smith* T.38; 5 miles SW. of Gregory Springs Stn., June 1953, *Perry* 3687; near (NW. of) Pentland,  $\pm$  475 m, July 1954, *Blake* 19343; 1.5 miles W. of Pentland, June 1953, *Perry* 3566; Myola Stn., W. of Charters Towers, Dec. 1959, *Hall* 1; Barratta Creek, NW. of Ayr, in 1962, *Wyatt* 11; Barratta Ck. area about 25 miles SW. of Ayr, June 1949, *Smith* 4336; Port Denison, June 1863, *Dallachy*; Mt. Roundback, near (W. of) Bowen, 15 m, July 1952, *Davison*; Lomond Mount

Mining Reserve, June 1936, *Macpherson* in *NQNC*.2768. SOUTH KENNEDY DISTRICT: Lake Elphinstone, *Dietrich* 1700; Mackay, *Dietrich* 2566, 2598; Clermont-Charters Towers Road, 93 miles from Clermont, May 1962, *Gittins* 474; Laglan Stn., Mar. 1958, *Smith*, 10358. PORT CURTIS DISTRICT: Between Carmila and Flaggy Rock, May 1927, *Francis*; Broad Sound, *Bowman*; near Broad Sound, coll.?, [Townshend I.], Aug. 1802, *R. Brown*; Yeppoon, Aug. 1912, *Boorman*; 3 miles S. of Marlborough, June 1960, *Trapnell* 22; Rockhampton, *O'Shanesy* 127, *Dietrich* 591, 1536, in 1908, *Simmons*; Bouldercombe, Nov. 1911, *F. W. Smith*; Butlerville, Oct. 1962, *Passlow*; Curtis I., Apr. 1962, *Home*; Parish of Eurimbula, Aug. 1920, *Eardley*; near Rodd's Bay, Nov. 1960, *Shaw*; Rosedale, Jan.-June 1921, *Dovey* 85 (in part). LEICHHARDT DISTRICT: 35 miles SW. of Nebo, June 1962, *Story & Yapp* 29; about 36 miles SSW. of Nebo, June 1962, *Story & Yapp* 74; Winchester Downs Homestead, about 50 miles SW. of Nebo, July 1962, *Story & Yapp* 122; about 5 miles NW. of Foxleigh Homestead, July 1962, *Story & Yapp* 172; Saltbush Park Stn., June 1954, *Bryan*; 20 miles S. of Emerald, Jan. 1958, *Bisset*; Blackdown Tableland, 12 miles SSE. of Bluff, Sept. 1959, *R. W. Johnson* 1028; Balmy Ck., [24° 18' S., 147° 8' E.], July 1846, *Mitchell* 241.

*Melaleuca nervosa* is found mostly as a small tree in pure communities or as an understory in eucalypt forests and is widely spread in Australia and southern New Guinea (fig. 21), chiefly on flattish ground with sandy surface soils. It is found in desert scrub within the 12-inch (30 cm) isohyet as a shrub as low as 1 m (*Blake* 15986, *Hill* 453). The usual colour of the flowers is greenish or greenish yellow to cream, but red-flowered trees are widely distributed though rare. The main flowering period is May-September but may extend to November, or in New Guinea to December. The chief distinguishing characters are the relatively small leaves often much more abruptly narrowed to the apex than base, two kinds of hairs, broad spikes, few stamens in each bundle and sepals without conspicuously thin margins, usually conspicuously woolly.

Both *Callistemon nervosus* and *Melaleuca crosslandiana* were based on specimens of red-flowered trees. The type locality of the former is at the southernmost inland limit of the species and of the latter at almost the extreme north-western limit. When publishing the combination *Melaleuca nervosa* Cheel quoted some remarks of Fitzgerald to the effect that *M. crosslandiana* had rough fibrous persistent bark but the type material includes bark like that of *M. nervosa*. Fitzgerald first mentioned *Melaleuca crosslandiana* in a brief paragraph in a daily newspaper with reproductions of photographs of specimens but this account has nothing in it to justify its acceptance as valid publication of the name; a cutting of the article is attached to the sheet of *Fitzgerald* 1116 (NSW). Another collection was cited in 1918 but *Fitzgerald* 1116 in Sydney has a type label and this should be accepted as lectotype.

The combination *M. leucadendron* var. *coriacea* forma *crosslandiana* was explicitly based on *M. crosslandiana* but published before the latter was validly published. The combination is however validated by the diagnostic phrase accompanying it.

The name *Melaleuca nervosa* Hort. ex Link was published merely as a synonym of *Leptospermum emarginatum* Wendl. f. and is accordingly invalid; it does not affect the use of the name *Melaleuca nervosa* (Lindl.) Cheel.

In Ewart & Davis, loc. cit., Cheel referred specimens of this species to *Melaleuca leucadendron* var. *coriacea* and *M. leucadendron* var. *minor* but his identification of *Metrosideros coriacea* was a guess. The remarks he quoted on p. 297-8 belong at least in part to other species—*M. viridiflora* and perhaps *M. leucadendron* as to the "largest and straightest timber tree in the North", and *M. viridiflora*, *M. leucadendron* and *M. argentea* as well as *M. nervosa* as to the remarks of Campbell, from whom the only specimens seen are of *M. nervosa* and *M. argentea*.

*Melaleuca minor* Sm. (*M. cajuputi* Powell) differs in having no crisped hairs, leaves of thinner texture with more slender veins and generally more acute, smaller flowers with sepals with broad thin glabrous margins, shorter stamens 7-9 in each bundle, and thinner-walled fruit.

*Melaleuca leucadendron* var. ? *parvifolia* was based on *M. lanceolata* R. Br. Herb., *Callistemon nervosus* Lindl. and *Leptospermum speciosum* Schau. The leaves, described as  $\frac{1}{2}$ -1 in. long, are smaller than those on the holotype and isotypes of *Callistemon nervosus* even though one sheet (MEL) marked by Bentham has leaves unusually small for the species only 2-5 cm long; Bentham's name must therefore be typified by *M. lanceolata* R. Br. Herb. which is *M. deanei* F. Muell. (see No. 11 below).

Timber of the species has been used in fencing for posts and rails (Chisholm, Davison) but according to Chisholm it does not withstand the attacks of termites for many years.

7. *Melaleuca argentea* W. V. Fitzg. Western Mail (Perth) 16 June (1906) et J. Roy. Soc. W. Aust. 3: 187 (1918). Type: Western Australia, base of Mt. Bartlett, Sept. 1905, *W. V. Fitzgerald* 1258 (holotype NSW; isotype PERTH, K).

*Melaleuca leucadendron* (L.) L. var. *angusta* Rivière, Bull. Soc. Nat. Acclim. France III, 9: 537, fig. 2 (1882), nomen, *syn. nov.* Type (P?) not seen.

MISAPPLIED NAME:

*Melaleuca leucadendron* (L.) L. var. *saligna* (Schau.) Cheel in Ewart & Davies, Fl. North. Territ. 296 (1917); non *Melaleuca saligna* Schau.

Tree 5-25 m, rarely shrubby, with a silvery crown, the smaller branches and twigs long, slender and pendulous. Bud-scales white, silky. Young shoots silvery with longer straight appressed silky hairs about 0.4-0.8 mm long and short variously curved or crisped, erect hairs 0.06-0.1 mm long. Full-grown adult leaves at length glabrous but the tomentum persisting for a long time on the petioles, closely and finely dotted; petioles convex beneath, flat or slightly convex above, incurved, 4-10 mm long, 0.8-1.1 mm wide; blades rather thickly

coriaceous, narrowly lanceolate, acute,  $\pm$  apiculate, gradually narrowed to the base from near the middle,  $\pm$  oblique to falcate, mostly 6–12 cm long, 6–12 mm wide, mostly 7–13 times as long as wide, 5- or 3-nerved with the nerves 0.25–0.35 mm wide, the cross-veins usually inconspicuous. Spikes terminal and up to 4 together, also solitary in the upper axils, 2.5–10 cm long, 3–4.5 cm wide, fairly densely flowered; axis 0.9–1.4 mm thick, silky with short and long, appressed to spreading hairs. Flowers greenish turning cream, often withering or drying reddish. Calyx green, about 2.5–3 mm long; tube shortly subcylindrical, 1.6–2.5 mm long, 2.3–3 mm wide, pubescent with white, short, mostly spreading hairs, pubescent also within; sepals much broader than long and overlapping at base, 0.7–1.1 mm long, 1.3–2 mm wide, firm and pubescent throughout except for a very narrow subscarios ciliolate margin, pubescent also inside. Petals greenish or whitish, soon falling, ovate-spathulate with a short broad claw and a concave suborbicular lamina, 2.3–3.7 mm long, 1.6–3 mm wide, ciliolate, sparsely pubescent on the outside chiefly near the centre or glabrescent, about 7-nerved, sparsely glandular with elliptic to oblong glands rarely confluent. Stamens about 5–7 in each bundle, the bundles 12–20 mm long; anthers yellow, elliptic-oblong, 0.6–0.9 mm long. Fruit shortly cylindrical with enclosed valves, 3–4 mm long and wide. Figs. 7, 14 G, 15 G.

WESTERN AUSTRALIA.—EREMEAN PROVINCE: Gascoyne R., Sept. 1941, *Gardner*; Ashburton R., Globe Hill, Sept. 1905, *Morrison* L.163. NORTHERN PROVINCE: Port Hedland, *Cleland*; near Beagle Bay Mission, Sept. 1959, *Lazarides* 6552; King Edward R., Aug. 1921, *Gardner* 1043; near Kalumburu Mission, Sept. 1954, *Speck* 4903; Hunter R., July 1921, *Gardner* 1473; base of Mt. Bartlett, Sept. 1905, *Fitzgerald* 1258; Bindoolah Creek, 26 miles NE. of Karunjie Stn., Sept. 1954, *Speck* 5017; Karunjie Stn., July 1952, *Perry* 3149; Fitzroy R. in 1881, *Paterson*; Ord R., Aug. 1949, *Langfield* 88, Sept. 1949, *Langfield* 106, 113, 115, Oct. 1949, *Langfield* 130; Fitzroy, Sept. 1959, *Lazarides* 6526; 31 miles W. of Tableland Stn., July 1959, *Lazarides* 6419.

NORTHERN TERRITORY.—DARWIN AND GULF DISTRICT: Darwin, etc. in 1913, *Spencer*; Port Darwin, *Schultz* 512, 543, 554; Liverpool R., *B. Gulliver*; Oenpelli, 12° 18' S., 133° 4' E., Oct. 1948, *Specht* 1118; South Alligator R., 13° 5' S., 132° 18' E., Sept. 1946, *Blake* 17101; Adelaide R., 13° 14' S., 131° 7' E., Aug. 1946, *Blake* 16695; near Mt. Todd Mine, Aug. 1948, *Perry* 1943; Ooloo Stn., Daly R., Sept. 1962, *Muspratt* 90 in NT. 9709; Edith R., July 1958, *Trapnell* 97; Katherine, Oct. 1958, *Chippendale* in NT. 5046; 11-mile Creek near Katherine, July–Aug. 1911, *Spencer*; Bradshaw Creek, 14° 30' S., 131° 20' E., Oct. 1946, *Blake* 17296; north of 15°, May 1911, *Campbell*; Fitzmaurice R., Oct. 1885, *Mueller*. VICTORIA RIVER DISTRICT: Mouth of Victoria R., Sept. 1855, *Mueller*; Victoria R., E. of Coolibah Stn., Oct. 1958, *Chippendale* in NT. 5040; [W. of Mataranka]\* July 1856, *Mueller*; near Alligator Springs, July 1949, *Perry* 2627.

QUEENSLAND.—BURKE DISTRICT: Settlement Creek, Sept. 1922, *Brass* 229; Albert R., *Henne*; 38 miles N. of Thornton Stn., May 1958, *Perry* 1075; 16 miles W. of Croydon, July 1960, *Trapnell* 207; Croydon, July 1954, *Blake* 19563; Yappar R., about SSE. of Croydon, July 1954, *Blake* 19657; Cloncurry, Feb. 1931, *Hubbard* 7339; 24 miles SE. of Cloncurry, July 1958, *Trapnell* 162; Richmond, *Berney* 71, June 1902, *Berney* 45, June 1934, *Blake* 6310.

---

\* The label reads: Dry places, tributary of the S. Alligator River, 4 July 1856. On this date *Mueller* was about 35 miles W. of the site of the present town of Mataranka, on tributaries of the Katherine R.

GREGORY NORTH DISTRICT: "Glenormiston", Georgina R., Oct. 1962, *Pedley* 1128. MITCHELL DISTRICT: Tower Hill, Apr. 1919, *White*. COOK DISTRICT: "Lockerbie," Nov. 1962, *Hyland* 2503; Archer R., Wenlock-Coen Road, 125 m, July 1948, *Brass* 19753; Coen, 200 m, Aug. 1948, *Brass* 19778; Morehead R., Nov. 1932, *Steele*; Hann R., Laura-Coen Road,  $\pm$  60 m, Oct. 1962, *Smith* 11699; Rutland Plains Stn., near mouth of Mitchell R., *Whitehouse*; Chillagoe, Jan. 1931, *Hubbard & Winders* 6749, Aug. 1963, *Treize*; near Chillagoe, June 1955, *Tracey & White* 5354; Alma-den, 480 m, Aug. 1913, *Cambage* 3868; Pinnacle Ck., SW. of Dimbulah,  $\pm$  420 m, July 1962, *Hoogland* 8514; Cumberland, May 1937, *Brass* 8850; Georgetown, Aug. 1913, *Cambage* 3897, Feb. 1922, *White* 1376 and *sine no.* NORTH KENNEDY DISTRICT: Rockingham Bay, *Dallachy*; Gray Creek near "Greenvale", July 1954, *Blake* 19440; Clarke R., near Telegraph Station, July 1954, *Blake* 19437; Jack Creek near (about SE. of) Clarke River Telegraph Stn., July 1954, *Blake* 19428; Basalt R., NW. of Charters Towers, near "Bluff Downs",  $\pm$  330 m, July 1954, *Blake* 19397; Betts Ck., 2 miles W. of Pentland, June 1953, *Perry* 3535; Peniland,  $\pm$  390 m, June 1934, *Blake* 6039; Charters Towers, Aug. 1903, *Walker*, July 1961, *Volck* 1946; near junction of Broughton and Burdekin Rivers near Charters Towers,  $\pm$  330 m, Jan. 1931, *Hubbard & Winders* 6976; Ravenswood Junction (= Mingela) 284 m, Jan. 1931, *Hubbard & Winders* 6967; Ana Branch bridge, near Ayr, June 1949, *Smith* 4393; Port Denison, Sept. 1863, *Dallachy* 38. PORT CURTIS DISTRICT: between Flaggy Rock and St. Lawrence, Oct. 1937, *White* 12104; Neerkol Creek, *Bowman* 60; Parkhurst, Apr. 1959, *Roff* 2; Rockhampton, July 1865, *Dietrich* 1983, in 1903, *Simmons*; Thozet Creek (Rockhampton), Feb. 1863, *Dallachy* 309; Lakes Creek, Rockhampton, Aug. 1912, *Boorman*; near Rockhampton, *Thozet* 45; Fitzroy Vale near Rockhampton, Nov. 1943, *White* 12503; S. of Westwood, on Sebastopol Creek, May 1956, *Blake* 19980A; Mt. Morgan, Oct. 1911, *Henrichson*; 3 miles SSW. of Mt. Morgan, July 1963, *Lazarides* 6893; halfway between Gladstone and Biloela, Dec. 1961, *Ronlund in QFD.* 62/339; Gladstone, July 1920, *White*; near (N. of) Bororen, May 1956, *Blake* 19921. LEICHHARDT DISTRICT: 20 miles NNW. of Nebo, June 1962, *Story & Yapp* 81; Boothill Creek, June 1958, *Pedley* 272.

*M. argentea* is a characteristic rheophyte of sandy or gravelly stream banks and beds in northern and north-eastern Australia (fig. 22); it sometimes occurs as a belt of trees behind *M. leucadendron* from which it is usually readily distinguished by the  $\pm$  silvery foliage and often smaller stature.

The amount and persistence of silky indumentum varies. It is very conspicuous on the type of *M. argentea* which has many fairly young leaves. Occasionally nearly glabrous trees are found, represented by Henne's specimens from the Albert R., *White* 1376, *Blake* 17296 and *Blake* 19437.

*M. argentea* approaches *M. nervosa* in many characters, but the leaves are relatively narrower, mostly longer, always acute, always  $\pm$  oblique or falcate, the calyx-tube is sometimes smaller but relatively broader, there are some circular glands on the petals and at least five filaments are present in each staminal bundle. Usually they are very unlike in the field, although *Blake* 19563 from Croydon with relatively short twigs and some leaves tending to be obtuse is less characteristic. The flowers are a pale greenish yellow, sometimes becoming pale cream; on withering they become reddish and this is the only basis for the reports of red flowers in this species. The usual flowering period is May–October.

A short account of *Melaleuca argentea* was first given by Fitzgerald in a daily newspaper, Western Mail (Perth), June 16, 1906, with a reproduction of a photograph of twigs in flower and fruit with bark. No characters of any

diagnostic value are given and the account can scarcely be regarded as constituting valid publication. The appropriate cutting from the paper is attached to the type sheet (NSW).

Cheel in Ewart & Davies Fl. North. Territ. 296 (1917) identified this species with *Melaleuca saligna* Schau. treating it as distinct from *M. leucadendron* var. *saligna* F. M. Bail. which, however, was implicitly based on the same name. Cheel's identification has not hitherto been questioned though S. Moore in J. Bot. 64: 93 (1926) made a few remarks on an isotype (BM). A photograph of this specimen is now at Brisbane. It represents a species quite distinct from *M. argentea* in having the leaves distinctly venulose and often only 3-nerved, a short capitate inflorescence and sepals that are membranous for the greater part; these characters are in accord with the original description. *M. argentea* is not yet known from anywhere near the type locality of *M. saligna* (Endeavour River).

*M. leucadendron* var. *angusta* was published without a description; the passage reads "On rencontre une plante semblable [à *M. leucadendron* minor] dans l'Australie du Nord, dans le Queensland, contrée déjà chaude, sous le nom de *M. leucadendron*, var. *angusta* (fig. 2)." The figure represents a single leaf the blade of which is nearly 10 times as long as wide (9.7 cm long, 1 cm wide) widest about the middle, and the petiole 1 cm long; it could apply only to *M. argentea*.

8. *Melaleuca stenostachya* S. T. Blake; species nova, affinis *M. cajuputi* Powell, *M. argenteae* W. V. Fitzg. et *M. nervosae* (Lindl.) Cheel, ab omnibus indumento, foliis pro more minoribus angustioribusve, petiolis pro more brevioribus spicis angustioribus earum axi tenuiore, staminibus brevioribus, antheris fructibusque minoribus differt; ab *M. cajuputi* indumento appresso, sepalorum marginibus angustioribus haud membranaceis, a *M. argentea* et *M. nervosa* pilis indumenti haud crispatis, ab hac etiam staminibus pluribus differt. Typus: Croydon, Qd, Blake 19566 (holotypus, BRI.045350).

Arbor usque ad 25 m alta cortice albido multilamellato oblecta, partibus juvenilibus dense sericea. Folia in ramulo unoquoque pro more 5–15, alterna, tandem glabra, rigida, anguste elliptico-lanceolata, utrinque acuta, recta vel admodum falcata, plerumque 3.5–10 cm longa 0.4–0.9 cm lata, 6–12-ies longiora quam lata, 5-nervia. Spicae terminales 2–4.5 cm longae 1.5–1.9 cm latae, subdensiflorae, floribus saepissime ternis; axis laxo sericeus, mox post tempus florendi excrescens. Calycis tubus 1.2–1.6 mm longus extus sericeus intus glaber; sepala fere omnino herbacea glandulosaque, marginibus angustis tenuiora, ciliata, subtriangularia, 0.6–1.1 mm longa, tubi dimidiam partem ad duas partes adaequantia, extus laxo pilosa intus prope basin pubescentia. Petala subcircularia, brevissime unguiculata glandulis paucis parvis rotundis vel ellipticis raro linearibus praedita. Staminum fasciculi 7–8 mm longi; filamenta in utroque fasciculo 5–9, raro 10; unguis petalo longior vel brevior; antherae 0.3–0.4 mm longae. Ovula multa in placenta peltata sita. Fructus ovoideo-globosi, 2–2.5 mm longi, 2.5–3 mm lati, ± pubescentes, sepalis ± persistentibus coronati, valvis breviter inclusis. Figg. 8, 14 H, 15 H.



Tree 4–25 m high with small crown and stiff spreading branchlets. Bud-scales ciliate, otherwise sparsely silky or glabrescent. Young shoots densely silky with appressed hairs up to 0.9 mm long. Leaves at length glabrous, about 5–15 mm on each twig; petioles 2–4 mm long, 0.85–1.2 mm wide; blades stiff but not very thick, closely dotted, narrowly elliptic-lanceolate, acute, attenuate at base, straight or oblique or somewhat falcate, 3.5–10 (–12) cm long, 4–9 (–15) mm wide, 6–12 times as long as wide, 5-nerved with nerve-like margins, the nerves 0.2–0.3 mm wide, the other veins fairly prominent. Spikes terminal, 1–4 together, 2–4.5 cm long, 1.5–1.9 cm wide, fairly densely flowered; axis 0.65–0.8 mm thick, loosely silky with appressed or ascending hairs. Flowers creamy white or greenish white, withering reddish. Calyx 1.8–2.5 mm long, silky; tube 1.2–1.6 mm long, 1.2–1.7 mm wide, silky outside, glabrous inside; sepals 0.6–1.1 mm long, 0.6–1.0 mm wide,  $\frac{1}{2}$ – $\frac{3}{4}$  as long as the tube, subtriangular, herbaceous and glandular for the greater part with narrow thinner ciliate margins 0.1–0.15 mm wide, loosely hairy over most of the outside, (the hairs sometimes wearing away), pubescent inside near the base. Petals subcircular with a very short claw, 1.4–2 mm long, 1–1.7 mm wide, ciliate otherwise glabrous, very finely 5–3-nerved, with a few small circular to  $\pm$  elliptical, sometimes linear glands. Stamens in bundles of 5–9 rarely 10; bundles 7–8 mm long with a claw 1–2.5 mm long; anthers suborbicular to shortly oblong, 0.3–0.4 mm long. Fruit ovoid-globose, 2–2.5 mm long, 2.5–3 mm wide, sometimes crowned by the persistent sepals; valves shortly enclosed. Figs. 8, 14 H, 15 H.

QUEENSLAND.—COOK DISTRICT: Cape York, in forest, June 1961, *Volck* 1954, on dry watercourse, June 1961, *Volck* 1955; "Lockerbie", 10 miles WSW. of Somerset, scattered in shallow seasonal swamps, 30 m, Apr. 1948, *Brass* 18350; Cody Creek, 13 miles WSW. of Somerset, common on moist sandy flats, 10 m, Apr. 1948, *Brass* 18529; Brown's Creek, Pascoe River, scattered as an overtopping tree in *Agonis* scrub of sandy ridges, 60 m, June 1948, *Brass* 19598; Cooktown, *Eucalyptus* forest on ridge, stony yellowish loamy soil with red subsoil overlying schist,  $\pm$  10 m, Jan. 1958, *Blake* 20221; Mt. Carbine, forming forests on the flats, Sept. 1936, *White* 10567; Mt. Molloy–Mt. Carbine Road, on flat lands and creek banks, March 1954, *K. J. White* 724; Mt. Molloy, Jan.–Apr. 1941, *Carr* 221; Chillagoe, Jan. 1918, *Michael* 304; near Chillagoe, forming communities in open forest on grey sandy soil in damp places, 315 m, Apr. 1938, *Blake* 13564; 48 miles W. of Dimbulah, open forest, June 1955, *Tracey & White* 5375; W. of Mareeba, Feb. 1960, *Goodall*; Gilbert R., Feb. 1922, *White* 1382. BURKE DISTRICT: Croydon, forming with *Eucalyptus grandifolia* a sparse community on ill-drained flats with hard light-grey soil, about 110 m, July 1954, *Blake* 19566; 6 miles W. of Westmoreland Stn., codominant on alluvial flats, June 1948, *Perry* 1334; Settlement Creek, May 1923, *Brass* 363.

*M. stenostachya* is widely spread in northern Queensland (fig. 25) and can be expected to be found in the Northern Territory. Its outstanding characters are the smallness of its parts, slender spikes, relatively large subtriangular sepals  $\frac{1}{2}$ – $\frac{3}{4}$  as long as the calyx-tube with narrow thin margins, and subglobose fruits; apart from these differences there is a superficial resemblance to *M. cajuputi*, *M. nervosa* and *M. argentea*, while except for the calyx the flowers are much like those of *M. saligna*. The thinner marginal band of the sepals is broader than in *M. nervosa* and *M. argentea* though hairy and much narrower than the glabrous bands of *M. cajuputi* and *M. saligna*. The indumentum lacks the short crisped hairs of the two former and is more appressed than in the two latter.

A few collections, chiefly in fruit, had been identified as *M. lasiandra* and some specimens of the two species bear a superficial resemblance, but *M. lasiandra* has smaller, more numerous, 3- or 1-nerved leaves, more numerous hairy stamens, a hairy style, cup-shaped or shortly cylindrical fruit, etc. The reference to the latter by F. M. Bailey, Dept. Agric., Brisbane, Bull. 13 (Bot. Bull. 4): 10 (1891), based on a specimen from Musgrave Telegraph Station collected by Jacobsen, now lost, probably refers to *M. stenostachya*.

*Brass* 18350 has larger, more falcate leaves than the others, about  $7.5 \times 1$  cm up to  $12 \times 1.6$  cm and the specimens came from much the largest trees recorded, 20–25 m high; otherwise the specimens resemble one another fairly closely. There is some variation in detail, especially in the presence or absence of linear glands in the petals, the number of filaments in each staminal bundle and in the length of the claws.

Specimens in flower have been collected from January to July, but some of the collections made within this period are in fruit only.

Specimens of this species were not seen by Bentham, Mueller or Cheel.

**9. *Melaleuca saligna*** Schau. in Walp. Repert. Bot. Syst. 2: 927 (1843), non (Gmel.) Bl. (1849); nec *Myrtus saligna* Burm. f. nec Gmel. Type: Queensland, swampy banks of the Endeavour River, *A. Cunningham* 256/1819, (holotype not traced, isotype, BM, photo BRI).

*Melaleuca leucadendron* (L.) L. var. *saligna* (Schau.) F. M. Bail. Syn. Qd Fl. 170 (1883); (Schau.) Cheel in Ewart & Davies, Fl. North Territ. 296 (1917); (Schau.) Domin, Biblioth. Bot. 89: 456 (1928). Based on *M. saligna* Schau. but misapplied to other species.

Tree to about 10 m high with many-layered whitish papery bark, green crown and pendulous branches. Twigs at first angular, at length terete, each with 7–11 alternate leaves. Bud-scales very broadly elliptic-ovate to narrowly ovate, closely nerved, pubescent in part to glabrous, the margins ciliate or not. Young shoots pilose with long and short hairs, soon glabrescent. Leaves scattered, not dotted; petioles compressed biconvex, pubescent, 2–8 mm long, 0.85–1.25 mm wide; blades soon glabrous, stiff, narrowly elliptic, symmetrical and straight or curved at base or oblique, often with one edge straight or nearly so, about equally acute at apex and base or somewhat acuminate, 3–(4–9)–9.5 cm long, 0.5–1.8 cm wide, 5–10 times as long as wide, 3–5-nerved with nerves about 0.2 mm wide and closely venulose. Flowers pale yellowish green to white, few in triads densely crowded into subglobose heads about 15–17 mm diam. at the ends of the twigs and in the upper axils, with the densely pubescent axis about 0.9 mm thick soon growing out, sometimes 2 or more heads produced in succession and becoming confluent. Calyx about 1.8–2 mm long; tube pubescent, angular, slightly widened upwards, 1.3–1.5 mm long, about 1.8 mm wide; sepals  $\pm$  oblate, broadly rounded,  $\pm$  herbaceous at and near the base with a membranous marginal band

0.1–0.3 mm wide, pubescent to pilose for the greater part, 0.5–0.7 mm long, 0.8–1 mm wide. Petals very thin, broadly obovate to nearly circular, concave, scarcely clawed, about 1.5–2 mm long, indistinctly about 3–5-nerved, eglandular or with a very few oblong or linear glands, ciliolate or glabrous. Stamens in bundles of 6–9, about 5.5–8 mm long with a claw about as long as the petals, the filaments  $\pm$  flabellately arranged on the upper part; anthers subglobose, 0.35 mm long and wide. Style much shorter than the stamens. Ovules very many on an oblong  $\pm$  peltate placenta. Fruits 2–2.5 mm long and 2.5–3.5 mm wide, cupshaped with thin walls, in dense ellipsoid or  $\pm$  globose heads at the base of twigs; valves about flush with the orifice. Figs. 9, 15 I.

QUEENSLAND.—COOK DISTRICT: Portland Roads, edging a sandy watercourse in savannah-forest, 10 m, June 1948, *Brass* 18978; Endeavour River, swampy banks of the river, *Cunningham* 256/1819; Endeavour River, *Persieh* 33, 84; Cooktown, just behind mangroves, July 1943, *Blake* 15073, May 1962, *Blake* 21799; edge of swampy ground, 0 m, Jan. 1958, *Blake* 20201; between Cooktown and Mt. Cook, banks of small stream, Aug. 1959, *Smith* 10569.

*Blake* 21799 is the only collection in both flower and fruit and *Brass* 18978 is the only other sheet in flower; the rest have fruits in various stages of development, those of *Blake* 15073 being quite immature with some sepals persisting. The distribution is shown in fig. 23.

Following Cheel, the name *Melaleuca saligna* or *M. leucadendron* var. *saligna* has usually been applied to *M. argentea* W. V. Fitzg. and the interpretation was evidently accepted by S. Moore, J. Bot. 64: 93 (1926) in his notes on the isotype at the British Museum. Moore mistook the very short head-like spike (distinctly visible on the photograph (BRI) of this specimen) for a fragment of a longer inflorescence. This short head is quite unlike the comparatively loose,  $\pm$  elongated spike of *M. argentea*. There is a superficial resemblance in the foliage, but there are more numerous leaves on the twigs in *M. saligna* and these are commonly shorter and often 3-nerved as noted by Moore and also prominently venulose. The indumentum consists of spreading, not appressed hairs and short crisped hairs are absent. The flowers are much smaller with thin sepals, scarcely clawed petals, short staminal bundles with relatively longer claws and subglobose anthers.

The combination *M. leucadendron* var. *saligna* was made independently by Bailey, Cheel and Domin, and applied wrongly by all. Both Bailey and Domin applied it to *M. leucadendron* sens. strict. Bailey's combination was treated by Cheel as a new name, a synonym of what he called *M. leucadendron* var. *mimosoides*, but it was implicitly based on *M. saligna* Schau. (see footnote to *M. leucadendron* var. *saligna* under *M. leucadendron*). Cheel and apparently also Domin did not see any material of true *M. saligna*.

Bailey misidentified *Persieh*'s specimens as *M. angustifolia* Gaertn. and his account of the latter under the number 186B in *Catal. Od Woods*, ed. 1, 36 (1886), ed. 2, 57 (1888) refers to *M. saligna*. *Persieh* 84 accompanied the wood specimen. *M. angustifolia* Gaertn. is a species of the *Circumscissae* with very different flowers.

10. *Melaleuca arcana* S. T. Blake; species nova, affinis *M. salignae* Schau. sed foliis heteromorphis latoribus brevius petiolatis, calyce inter sepala atque ad basin barbato, sepalis  $\pm$  deltatis, petalis conspicue unguiculatis praecipue differt. Typus: "NW. of Cooktown and W. of Cape Bedford", Qd, *Blake* 20260 (holotypus BRI. 045402, 045403).

*Melaleuca leucadendron* (L.) L. var. *albida* Cheel forma *ruscifolia* Cheel in Ewart & Davies, Fl. North. Territ. 302 (1917). Type: [Queensland, Point Lookout] *Banks & Solander*; holotype, NSW; isotypes BM (photo NSW, BRI), MEL, E, K, P, W.

*Melaleuca ruscifolia* Sol. ex Cheel in Ewart & Davies, Fl. North. Territ. 302 (1917), *pro syn.* Type: as for *M. leucadendron* var. *albida* forma *ruscifolia*.

Frutex vel arbuscula cortice albido multilamellato obtectus. Ramuli primo angulati sericei, tandem teretes glabrescentes, pro more 9–13 folia alterna gerentes. Folia quoad magnitudo formaque variabilia, subsessilia vel brevipetiolata, petiolis 0.5–3.5 mm longis exceptis mox glabra, late elliptica vel oblanceolata vel anguste lanceolata, varie obtusa usque  $\pm$  acuta,  $\pm$  mucronata vel mutica, vel recta vel obliqua vel curvula, 1.8–5 cm longa, 0.8–1.5 cm lata, 2–5.5-ies longiora quam lata, pro more 5-nervia nervis 0.25 mm latis atque paribus 1–2 nervorum secundariorum longitudinalium cum venis oblique transversis additis. Inflorescentia dense et brevissime spiciformis, terminalis vel in axillis superioribus sita, 6–8 mm longa, circa 15 mm lata; axis longe villosus, circa 1.4 mm crassus mox post tempus florendi excrescens. Flores terni. Calyx circa 2.5 mm longus; tubus late turbinatus, ima basi atque inter sepala fasciculum pilorum longiorum gerens ceterum glaber vel sursum etiam pilosus; sepala deltato-ovata, acuta vel rotundata, 0.9–1.1 mm longa lataque, decidua, herbacea, margine circa 0.25 mm lato tenuiter membranaceo ciliato praedita, intus prope basin  $\pm$  puberula. Petala supra unguem brevem latum recurva, concava, subcircularia, ciliata, circa 1.7–2 mm longa, irregulariter tenuiterque 3–5-nervia, glandulas paucas elongatas ferentia. Staminum fasciculi 6–6.5 mm longi; unguis latus 0.9–1.4 mm longus; filamenta 6–9 inaeque unita; antherae circa oblongae 0.45–0.5 mm longae. Ovula in utroque loculo plus quam 30 in placenta peltata pro ratione magna sita. Fructus in capitulis saepe ad basin ramulorum sitis globosis vel breviter ellipsoideis 8–13 mm longis 8–10 mm latis dense aggregati,  $\pm$  cupuliformes, 2.5–3 mm longi, 2.5–2.7 mm lati, valvis valde inclusis. Figg. 10, 15 J.

Shrub or tree up to 10 m with many-layered whitish papery bark, erect branchlets and green crown. Twigs stiff, at first angular and silky, later terete and glabrous, whitish, with 7–17 (mostly 9–13) spirally arranged leaves. Bud-scales ovate to lanceolate, closely nerved,  $\pm$  ciliate, otherwise glabrous. Young shoots silky, the hairs very fine, closely appressed, mostly 0.5–1 mm long. Leaves variable in size and shape, subsessile to shortly petiolate, soon glabrous except the petioles; petioles 0.5–3.5 mm long, 1.1–1.4 mm wide, much compressed; blades stiff, broadly elliptic to oblanceolate or narrowly lanceolate, variously obtuse to  $\pm$  acute,  $\pm$  mucronate or muticous, straight or oblique or slightly curved, 1.8–5 cm long, 0.8–1.5 cm wide, 2–5.5 times as long as wide, those on barren shoots or juvenile plants much the shorter and subsessile but these also on flowering shoots, commonly 5-nerved with 1–2 pairs of secondary longitudinal veins with oblique cross-veins, the nerves 0.25 mm wide. Flowers few in triads densely crowded in short spikes that are terminal and in the upper axils and 6–8 mm long

and 15–20 mm wide; axis long-villous, about 1.4 mm thick, growing out shortly after flowering (the bud present at flowering time). Calyx about 2.5 mm long; tube broadly turbinate about 1.5 mm long and 1.8 mm wide with a tuft of long hairs (up to 0.6 mm long) at the base and a tuft between each sepal, sometimes also  $\pm$  pilose in the upper part, otherwise glabrous inside and out; sepals deltate-ovate, acute or rounded, 0.9–1.1 mm long, 0.9–1.1 mm wide, deciduous, herbaceous and pilose to glabrous with a few circular glands, with a broad thin membranous ciliate margin about 0.25 mm wide,  $\pm$  puberulous inside near the base. Petals with a short broad claw and a recurved concave subcircular ciliate lamina, about 1.7–2 mm long, irregularly 3–5-nerved, the nerves faint and  $\pm$  confluent below with a few linear or elongate linear glands. Staminal bundles 6–7 mm long with a broad claw of 0.9–1.4 mm and 5–9 filaments unevenly united; anthers about oblong, 0.45–0.5 mm long. Ovules numerous (above 30) on a relatively large peltate placenta. Fruits densely crowded in globose or shortly ellipsoid heads 8–13 mm long, 8–10 mm wide, often at the base of branches,  $\pm$  cup-shaped, 2.5–3 mm long, 2.5–2.7 mm wide, with well included valves. Figs. 10, 15 J.

QUEENSLAND.—COOK DISTRICT: Newcastle Bay, abundant in moist heathy hollows between coast sand dunes, May 1948, *Brass* 18651; [Point Lookout], *Banks & Solander*; NW. of Cooktown and W. of Cape Bedford, wallum country, sandy soil,  $\pm$  80 m, Feb. 1958, *Blake* 20260; Hopevale Mission, NW. of Cooktown, Sept. 1960, *Smith* 11166 (sterile).—Fig. 23.

*M. arcana* differs from *M. leucadendron* and its closest allies in the more numerous leaves on each shoot, the very short petiole, the densely compacted capitate inflorescence, and the often extreme variation in leaf form and size on a single twig. The inflorescence and staminal bundles resemble those of *M. saligna*, but so far as can be judged from the few collections known the species differs from all others examined both in the peculiar foliage and the tendency for the hairs on the calyx to be gathered into tufts. The crushed leaves have a definite citron scent as noted by Brass. Brass's specimens were from a shrub in fruit 1 m high for which the native name of WINTI was recorded. My specimens have flowers that were withering when collected as well as fruit. Banks and Solander's specimens in bud and fruit were described by Brown in his MS under Solander's MS name of *Metrosideros ruscifolia* with the statement that they were collected near Point Lookout (a headland near Cape Bedford about N. of Cooktown now known as Lookout Point). The sheet at Sydney (NSW.19972) on which Cheel based his name *Melaleuca leucadendron* var. *albida* forma *ruscifolia* was distributed from the British Museum as "*Melaleuca leucadendron* L. var. (Benth. in herb.) (*M. ruscifolia* Soland. MS.)" Cheel interpreted the latter name as *Melaleuca ruscifolia* which he quoted as a synonym; this is an invalid name but Cheel validated the quadrinomial by referring to the size of the leaf. The sheet in Melbourne has a similar label. The unsatisfactory nature of the Banks & Solander material makes it unwise to base a name on it. I have therefore chosen a new epithet with the only known collection in flower as type; this is possible because Cheel's epithet is not in the required rank and his reference to *M. ruscifolia* Sol. does not validate

this name. The epithet *arcana* (secret, hidden) refers to the apparent rarity of a species found four times in nearly two centuries and found only once in flower almost 188 years after the first collection.

[A tree 5 m high in the Brisbane Botanic Gardens raised from seed from *Blake* 20260 flowered in Feb. 1966 and Jan. 1967 (*Blake* 22393, 22780). The inflorescences are slightly larger, up to 10 mm long and 20 mm wide with white staminal bundles pink at the base up to 7 mm long sometimes with only 5 filaments. These variations are included in the English description.]

**11. *Melaleuca deanei*** F. Muell. Proc. Linn. Soc. N.S.W. ser. II, 1: 1106 (1887).

Type: Lane Cove R., N.S.W., *Deane* (holotype, MEL, photo BRI; isotype NSW).

*Myrtoleucodendron deanei* (F. Muell.) O. Kuntze, Rev. Gen. Pl. 1: 241 (1891). Based on *Melaleuca deanei*.

*Melaleuca lanceolata* R. Br. ex Benth. Fl. Aust. 3: 143 (1867) *pro syn.*;  
ex R. T. Baker, Proc. Linn. Soc. N.S.W. 38: 601 (1914), *syn. nov.*  
Type: *R. Brown* 4675 (MEL, K).

*Melaleuca leucadendron* (L.) L. var. ? *parvifolia* Benth. Fl. Aust. 3: 143 (1867) as to *Melaleuca lanceolata* R. Br.

*Melaleuca glauca* R. Br. ex Domin, Biblioth. Bot. 89: 457 (1928) *pro syn.* Type: Sydney, *R. Brown* (K; isotype E).

Shrub or small tree 1–3 m high. Twigs stiff, glabrous, with 12–27 leaves, rarely fewer. Bud-scales ciliate, the lower ones depressed ovate, strongly striate and glabrous on the back, the upper ones oblong obtuse, about 1-nerved, silky-pubescent. Young shoots silky, soon glabrescent. Leaves straight, glabrous, rather crowded but distinctly spiral; petioles more or less concavo-convex, 0.9–2.2 mm long, 0.5–1 mm wide; blades coriaceous, stiff, oblanceolate or narrowly subelliptic, straight, more or less abruptly narrowed to an acute or also a shortly acutely acuminate tip, gradually narrowed to the petiole, flat or the sides slightly recurved, about 1.5–2.5 cm long, 0.4–0.7 cm wide, about 2.5–4 times as long as wide, 3- or rarely 5-nerved with the outer pair close to the margin and pinnately veined between, the midvein 0.25–0.35 mm wide. Spikes solitary, terminal or also in the upper axils, 3–8 cm long, 2.5–3 cm wide, rather densely flowered; axis 1.3–1.5 mm thick, densely villous with spreading hairs to 0.7 mm long. Flowers solitary. Calyx  $\pm$  5.5–6.5 mm long; tube subcylindrical, 4–5 mm long,  $\pm$  3 mm wide, densely pubescent outside, glabrous inside; sepals nearly semicircular 1.3–1.5 mm long, 1.6–1.8 mm wide, firm, slightly thickened towards the middle of the lower part, with round glands, densely villous outside, villous inside except for a marginal band. Petals broadly elliptic, concave, unguiculate, densely silky outside, glabrous within, 4–5 mm long, 2.5–3 mm wide with a claw about 0.5 mm long and with a few short nerves of which one alone is at all conspicuous; glands very few, round, or absent. Stamens 17–28 in each bundle, very shortly pinnate and also on the upper surface, occasionally sparsely pilose towards the base, the bundles 10–12 mm long with a claw 1.5–2 mm long; anthers 0.7–0.8 mm long, sometimes pilose on the back. Ovary occupying about half the height of the calyx tube; stigma peltate and slightly concave; ovules very many on a peltate placenta,

ascending. Fruit barrel-shaped or subcylindrical, thick, smooth, glabrous with thick depressed rim and deeply enclosed valves, 7–8 mm long, 6–7 mm wide. Figs. 11, 15K.

NEW SOUTH WALES.—CENTRAL COAST: Berowra, Oct. 1902, *Boorman*; Galston, Oct. 1924, *A. Morris* 1220; Hornsby, Oct. 1903, *Cheel*, Oct. 1914, *Blakely*, Dec. 1914, *Blakely*, Oct. 1918, *Blakely*; Hornsby–Dural, Oct. 1946, *L.A.S. Johnson* 785; Gordon, Oct. 1884, *Deane*, Lane Cove R., Oct. 1884, *Fletcher*, July 1917, *Fletcher*; Ryde, May 1914, *F. R. Smith*; Sydney, *R. Brown* “4675” and *sine no.*; Tempe, *Williams*, Oct. 1898, *Hamilton*, Jan. 1899, *Hamilton*; Cook’s R., Oct. 1901, *Hamilton*; Arncliffe, Oct. 1897, *Camfield*; Kogarah, Oct. 1894, *Camfield*; Oatley, Oct. 1899, *Boorman*; Sutherland, Nov. 1901, *Boorman*; Waterfall, Jan. 1952, *King*.

This species appears to have a very limited distribution (fig. 23) and to be very rare. Most of the localities cited are within the Sydney metropolitan area. Of the species dealt with in this paper this is the only one I have not examined in the field. According to A. A. Hamilton (Proc. Linn. Soc. N.S.W. 26:472 (1901)), the type specimens were taken from isolated plants and those from Arncliffe and Kogarah were from individual plants. According to one of Blakely’s labels, the species was common at Hornsby in 1914 but had by that time disappeared from Lane Cove and Cook’s R.; however specimens were taken by Fletcher in the former area in 1917, the largest plants being about 8–9 feet high and 4–5 in. diam. (Fletcher, Proc. Linn. Soc. N.S.W. 43: 416 (1918)). It was stated in the original account that “Mr. Betcher seems to have found the identical plant on the Richmond River” but Betcher’s specimens belong to *M. sieberi* Schau.

*Melaleuca deanei* was described from material collected by Deane “on the northern side of the Lane Cove River, occupying sandy ground on the ridges” in a paper read 24th November 1886. The locality must have been quoted from a letter, for no label with this information has been found in herb. Sydney where Deane’s personal herbarium is deposited, or in herb. Melbourne. Three collections made by Deane are represented on the type sheet (MEL), all with the locality “Lane Cove R.”. One is a packet of fragments marked in Mueller’s writing as having been collected in December 1886 (after the paper was read) and is not represented at Sydney. A small flowering piece evidently belongs to the same gathering as NSW.19957, collected October 1884, from Gordon, according to Deane’s own annotation; there is a partly erased remark in pencil by Deane on his original sheet showing that material had been seen by Mueller. The other piece on the Melbourne sheet is in fruit, collected 1886; the corresponding sheet in Sydney, NSW.19951 has a flowering piece also. The packet on the type sheet must be treated as extraneous, but no useful purpose can be served at present by selecting a lectotype from the other material.

Mueller compared the species with his concept of *M. parviflora*—*M. parviflora* Lindl. non Otto would be meant, though the species he had in mind was *M. lanceolata* Otto—which it certainly resembles in more characters than *M. leucadendron* or any of its immediate allies, but the larger leaves with well marked venation and much larger flowers give it a very different appearance.



The name *Melaleuca lanceolata* occurs on labels to Brown's specimens distributed as *R. Brown* 4675 (MEL, K), but the plant described under this name in Brown's MS is a *Tristania*. The first published reference is by Bentham, Fl. Aust. 3: 143 (1867) under *M. leucadendron* var. ? *parvifolia* Benth. where *M. lanceolata* R. Br. Herb. is quoted as a synonym with the locality "Behind the Government House, Sydney", together with *Callistemon nervosus* Lindl. and *Leptospermum speciosum* Schau. Bentham's description of "Leaves mostly  $\frac{1}{2}$ –1 inch long. Flowers small and only very slightly pentadelphous" may have been intended to refer to all, but the flowers of *Callistemon nervosus* are certainly not small, they are very evidently pentadelphous, and the leaves on the holotype and isotypes are longer than 1 inch (see *Melaleuca nervosa* No. 6). He stated that Cunningham's specimens (the type of *Leptospermum speciosum*) were in bud only; those at Kew were referred by Domin to *Melaleuca leucadendron* L. var. *speciosa* (Schau.) Domin, Biblioth. Bot. 89: 457 (1928) and by C. T. White to *Agonis speciosa* (Schau.) C. T. White in Proc. Roy. Soc. Qd 53: 218 (1942), a species in which the filaments are entirely free and shorter than the petals; in a study of generic limits in Proc. Roy. Soc. Qd 69: 79 (1958) I followed Schauer's disposition of the species. Brown's specimens have the small leaves and the short claws to the staminal bundles bearing filaments almost to the base may have led Bentham to state that the stamens were only slightly pentadelphous; it is possible that Bentham was not able to see the stamens clearly for reasons given in the introduction to Fl. Aust. 1: 9\*, in which case the filaments on the upper side of the claws may have made the latter appear still shorter.

Maiden, Forest Fl. N.S.W. 1: 91 (1903), thought that Brown's plant belonged to *M. deanei* but he saw no specimens. Baker & Smith, J. & Proc. Roy. Soc. N.S.W. 47: 195, 200 (Feb. 1914) stated that *M. lanceolata* R. Br. and *M. sieberi* Schau. were *M. leucadendron* var. *parvifolia* Benth., but Bentham did not mention *M. sieberi* in this connection. They accepted *M. lanceolata* as a "valid species" with *M. sieberi* Schau. as a synonym. R. T. Baker, Proc. Linn. Soc. N.S.W. 38: 601 (March 1914) stated "*M. lanceolata* has leaves under 1 inch long, a white woolly inflorescence, and a constant trinerved venation". This remark must be accepted as constituting valid publication of the name. *M. sieberi* is a very different species discussed below (No. 13).

Cheel, without seeing Brown's specimens, thought that *M. lanceolata* R. Br. was distinct from *Callistemon nervosus* on plant-geographical grounds. Domin, in Biblioth. Bot. 89: 457 (1928), under *M. leucadendron* var. *nervosa* (Lindl.) Domin wrote "*M. lanceolata* R. Br. ex Benth. l.c. (*R. Brown* Iter australiense 1802–05 no. 4675) ist eine andere verwandte Varietät, welche mit der von *R. Brown* in Schedis als *M. glauca* bezeichnete Pflanze von Sydney identisch ist". There was no formal publication of the epithet *lanceolata* in varietal rank, and I have found no other reference to *M. glauca*. The specimen labelled *Melaleuca glauca* certainly belongs to *M. deanei*.

There is an earlier published use of the name *Melaleuca lanceolata*, that by Otto in Horae Phys. Berol. 36 (1820). This refers to a very different species discussed below (No. 14).

*Melaleuca deanei* and *M. groveana* Cheel & White superficially resemble some of the species closely allied to *M. leucadendron* because of the large spikes of large flowers, short staminal claws, very numerous ovules and papery bark, but the leaves are much more numerous on the twigs (mostly 7–27), subsessile, smaller or narrower on the average, commonly 1–3 (rarely 5)-nerved, and  $\pm$  pinnately veined between the nerves, the flowers are solitary in the spikes (not in triads), the stamens are much more numerous (12–26 in each bundle, some on the upper surface) and the capsule is deeply enclosed.

**12. *Melaleuca groveana*** Cheel & White, Proc. Roy. Soc. Qd 36: 41 and fig. (1924). Type: Near Edenvale Railway Station, Qd, Grove 132 (NSW, BRI).

Shrub or small tree 2–5 m high with hard whitish flaky rather thin papery bark peeling off in large flakes, and a bushy green crown with purplish young growth. Twigs stiff, glabrous, with 7–18 leaves. Bud-scales thin, broadly ovate to ovate-lanceolate, about 3 mm long, 1–3-nerved, densely silky or glabrescent. Young shoots at first silky-tomentose, soon glabrous; hairs flexuose or the longer ones straight. Leaves at length glabrous, scattered, closely dotted; petioles compressed,  $\pm$  concave-convex, 1.5–2.5 mm long, 0.5–1.1 mm wide; blades coriaceous, stiff, somewhat lanceolate-linear to oblanceolate-linear, acute or shortly acuminate with a very acute but not pungent tip, straight or slightly oblique, about 2.5–5.7 cm long and 2.5–8 mm wide, about 5–11 times as long as wide, 3-nerved with the lateral nerves close to the margin, rarely sub-5-nerved, the nerves 0.2–0.3 mm wide, cross-veins not very conspicuous. Spikes terminal or also in the upper axils, usually solitary, 1.5–3 cm long, 2.5–3 cm wide, about 6–15-flowered; axis 0.8–1 mm thick, tomentellous at least under the flowers. Flowers solitary, white. Calyx about 4.5–5 mm long, nearly glabrous; tube turbinate, glabrous inside and out, strongly glandular, about 3–4.5 mm long, 2.5–3.5 mm wide; sepals nearly semicircular, 1–1.5 mm long, 1.5–2 mm wide, thick and coarsely glandular, becoming thinner and glandless near the margin, ciliolate otherwise glabrous outside, shortly pubescent within. Petals very thin, subcircular and deeply concave on a very short claw, with about 3–5 faint  $\pm$  branched nerves and a few small circular glands, minutely ciliolate otherwise glabrous, in all 3–4.5 mm long, 2.5–3 mm wide. Stamens in bundles of 12–26, the bundles 9–12 mm long with a short broad claw 1.3–2.2 mm long, the filaments arranged along the margin and upper surface; anthers oblong, 0.55–0.9 mm long. Ovary free in upper third; style nearly equalling the stamens; stigma slightly peltate; ovules very many on a peltate placenta. Fruit smooth and shining, truncately ovoid to barrel-shaped, 5–7 mm long, 5–7 mm wide; capsule deeply enclosed. Figs. 12, 15 L.

QUEENSLAND.—BURNETT DISTRICT: Proston, May 1940, *Blake* 14264; near Kingaroy, Sept. 1919, *Grove* 132, Aug. 1954, *Everist*, Sept. 1954, *Blake* 19702, 19703. MORETON DISTRICT: Mt. Beerwah, Sept. 1957, *D. McGillivray* 290, Aug. 1966, *Blake* 22757.

NEW SOUTH WALES.—NORTHERN TABLELANDS: Torrington, Oct. 1911, *Boorman*. NORTH COAST: South Brother Mt., John's River, June 1915, *Boorman*, Feb. 1926, *Cheel*; Port Stephens, Feb. 1947, *L. A. S. Johnson*.

Apparently a rare species (fig. 23) about which little is known. The type locality was stated in the original account to be "Top of a high dry volcanic ridge near Edenvale Railway Station, Nanango District". Actually, Edenvale Railway Station is close to Kingaroy and the only ridge in the neighbourhood is a low plateau with red soil and a steep scarp; such soils are popularly called "red volcanic soils" in eastern Queensland. It was on the top of this plateau near the scarp that *Blake* 19702, 19703 and *Everist* were collected; very few plants were found in a mixed tree-shrub community.

The original account is defective in other respects. The material available consisted of twigs with fruits and immature buds, some bark and wood. The description and figure of the flower were prepared from an artificially opened young bud and are quite misleading; the bark is not fibrous (except for the fibrous layers between the papery layers) but is harder than in many other "paper-barks".

**13. *Melaleuca sieberi*** Schau. in Walp. Repert. Bot. Syst. 2: 928 (1843). Type: [near Sydney], *Sieber* 601 (isotypes: MO, photo BRI; W).

*Melaleuca parviflora* Lindl. var. *latifolia* Maiden & Betche, Census N.S.W. Pl. 155 (nomen), 156 in nota (descr.) (1916), *syn. nov.* No specimen or precise localities cited. Lectotype: Wardell, June 1884, *Betche* (NSW), isoelectotype, MEL.

Shrub or tree to 9 m with whitish many-layered papery bark and a closely branched crown. Twigs pubescent or at length glabrous, densely leafy with mostly 18–40 leaves,  $\pm$  angular. Leaves scattered but dense, distant by very much less than their length, very shortly petiolate,  $\pm$  twisted, otherwise flat, lanceolate to linear or elliptic-linear, callous-acute, shortly attenuate to a very short broad  $\pm$  pubescent petiole 0.5–0.7 mm long, 4.5–9.5 mm long, 1–1.8 mm wide, the blades glabrous, 1-nerved or nerveless. Inflorescence a short dense spike 1–2 cm long, about 1.7–2 cm wide; axis densely villous, usually not growing out until flowering is over; bracts persistent at least till the flower expands,  $\pm$  ovate, concave, pubescent,  $\pm$  glandular, about as long as the calyx or a little shorter. Flowers solitary, spiral, close together. Calyx 2.5–3.5 mm long, 2–2.5 mm wide,  $\pm$  ovoid or oblong, villous; sepals erect, herbaceous,  $\pm$  broadly triangular-ovate or broader than long, rounded, 0.8–1 mm long, pubescent inside, nerveless. Petals  $\pm$  erect, subcircular, concave, abruptly narrowed to a short broad claw about 0.5–0.7 mm long; lamina about 1.5–2 mm long and wide, glabrous, eglandular, nerveless. Staminal bundles about 5.5–6 mm long with a broad claw shorter than the petals about 1.4–2 mm long, with 8–14 filaments in about 2 series chiefly at the end;

anthers 0.5 mm long. Ovary free for about  $\frac{2}{3}$  its height; ovules very numerous, densely covering a peltate placenta. Fruits few,  $\pm$  cupshaped with persistent incurved sepals, about 5 mm long and wide; valves shortly enclosed to about flush with the orifice. Figs. 13, 15 M, 24.

QUEENSLAND.—Wide Bay and Moreton Districts.

NEW SOUTH WALES.—North Coast and Central Coast.

*Melaleuca sieberi* Schau. was presumably based on a Sieber specimen, though no collector's name or number was quoted. Benth, Fl. Aust. 3: 143 wrote that it "from the character given, is most probably to be included among the forms of *M. leucadendron*", but the 3-nerved leaves, herbaceous sepals, polyandrous staminal bundles with filaments fastigate from the end exclude it from *M. leucadendron* and all its immediate allies, and certainly cannot be found on *Sieber* 319 (*M. quinquenervia*). The only Sieber number found that agrees with the description is *Sieber* 601, apparently not seen by Benth, though referred with a query to *M. genistifolia* Sm. (i.e. *M. decora* (Salisb.) Britten) by De Candolle, Prodr. 3: 212 (1828) and tentatively to this by R. Brown in his MS.

This is also the species identified with *M. genistifolia* Sm. by Baker and Smith, J. & Proc. Roy. Soc. N.S.W. 45: 365 (1912) and with *M. lanceolata* Otto by Cheel, op. cit. 78: 64 (1944). It differs from both in having the flowers singly arranged along the axis (not in pairs or triads) and in the nerveless sepals, and from the former (= *M. decora* (Salisb.) Britten) in the glabrous style and fewer filaments and from the latter in the papery bark, short broad claw of erect petals and longer staminal claw.

It was identified with *M. ericifolia* Sm. by F. M. Bailey, Syn. Qd Fl. 171 (1883) and Qd Fl. 2: 603 (1900) but the two species differ greatly in aspect because of the very narrow leaves and very dense spikes of the latter which also has more or less glabrous flowers, reflexed petals with dot-like glands and staminal bundles with 6–9 filaments.

The sheet selected as lectotype of *M. parviflora* var. *latifolia* was annotated by Betcher: "Described in the new Census as *M. parviflora* var. *latifolia*". A duplicate at Melbourne is the specimen from the Richmond River referred by Mueller with some doubt to *M. deanei* in the protologue of the latter.

14. *Melaleuca lanceolata* Otto, Horae Phys. Berol. 36 (1820) non R. Br. ex R. T. Baker (1914). Type: From plant cultivated in Berlin Botanic Gardens; isotype G-DC (photo BRI).

*Melaleuca pubescens* Schau. in Walp. Repert. Bot. Syst. 2: 928 (1843), syn. nov. Type: Lachlan R., N.S.W., Cunningham 283/1817 (K, isotype, photo BRI).

*Melaleuca curvifolia* Schlechtendal, Linnaea 20: 654 (1847), syn. nov.

Type: Light R., South Australia, Behr (holotype or isotype, ex herb. Sonder, comm. Schlechtendal, MEL; isotype, G).

*Melaleuca parviflora* Lindl. var. *pubescens* (Schau.) Domin, Biblioth. Bot. 89: 457 (1928). Based on *M. pubescens*.

*Cajuputi pubescens* (Schau.) Skeels, U.S. Dep. Agric. Bur. Pl. Indust. Bull. 242: 41 (1912). Based on *Melaleuca pubescens*.

Shrub or tree to 10 m, with blackish, rough, fissured bark. Twigs with white lines below the petioles. Young shoots  $\pm$  pubescent. Leaves scattered, about 20–60 per shoot, linear or linear-lanceolate, acute, narrowed to a petiole  $\pm$  0.6–1.1 mm long which is shorter than the width of the blade, obliquely erect or spreading,  $\pm$  recurved towards the tip,  $\pm$  concave above, indistinctly 3-nerved, 5–15 mm long, 0.8–3 mm wide, not dotted. Flowers mostly ternate in interrupted sometimes leafy spikes 1–5 cm long, 1.7–2 cm wide, at first terminal but the pubescent axis growing out often before the flowers open. Calyx 2.5–4 mm long, 1.6–1.7 mm wide, glabrous outside; tube oblong-cylindrical to  $\pm$  turbinate; sepals deltate,  $\pm$  rounded at the top, 0.5–0.9 mm long, about 0.6–0.8 mm wide,  $\pm$  herbaceous and 1-nerved, thinning towards the margin, pubescent inside. Petals about 2 mm long, subcircular with a linear reflexed claw about 0.5 mm long, the lamina concave but soon inrolling along its length, 1-nerved, about 1.5 mm diam. when relaxed. Staminal bundles about 5.5–6 mm long with a short broad claw 1–1.4 mm long and 8–14 filaments in two transverse series at and near the end; anthers oblong, 0.4 mm long. Ovary occupying about  $\frac{1}{2}$  the height of the calyx tube, free from it in the upper half; style glabrous, ovules very numerous,  $\pm$  ascending, covering an obliquely peltate placenta. Fruit ovoid or subglobose, 4–5 mm long, 4 mm wide, sepals persisting for some time or at length deciduous; orifice 1 mm diam.; capsule deeply enclosed.

DISTRIBUTION (Fig. 26). Darling Downs District of Queensland, western New South Wales, drier parts of Victoria, southern Australia to south-western Western Australia (Willis, Vict. Nat. 65: 79 (1948), C. T. White, op. cit. 66: 39 (1949), Blake & Roff, Honey Fl. SE. Qd 115 (1959\*). I have also seen specimens from plants cultivated in California (MO) and Europe (MO, G-DC).

Bentham, Fl. Aust. 3: 145 (1867) included this species under *M. preissiana* Schau., citing *M. pubescens* Schau. and *M. curvifolia* Schlechtendal as synonyms and distinguishing a var. *leiostachya* Benth. with which he identified *M. parviflora* Lindl.; as synonyms of *M. genistifolia* Sm. he cited (p. 144) *M. lanceolata* Otto "from the diagnoses in DC. Prodr. iii. 212", *M. bracteata* F. Muell., and *Metrosideros decora* Salisb. De Candolle stated that he had a specimen of *M. lanceolata* from Otto, Cheel, Proc. Linn. Soc. N.S.W. 51: 408–10 (1926) pointed out that the name *M. pubescens* has priority over *M. preissiana* but he thought that these names as well as the later *M. curvifolia* referred to the same

---

\* The date on the title page of this is 1958; it was issued in February 1959.

species though specimens identified with the last-mentioned might constitute a var. *curvifolia*; no ternary combination was actually published. Willis, Vict. Nat. 65: 76–84 (1948) held that *M. pubescens* and *M. preissiana* were distinct species; he gave an account of the former but gave only differences in the bark to distinguish them.

Baker and Smith, J. & Proc. Roy. Soc. N.S.W. 44: 601 (1911) and 45: 365 (1912) recognized three species among the plants passing as *M. genistifolia* in New South Wales. They first treated *M. bracteata* as distinct; then they supposed that the names *M. genistifolia* and *M. lanceolata* referred to the other two species and under *M. genistifolia* gave an account and figure of the species taken up above as *M. sieberi*. From correspondence in Brisbane it appears that Baker sent a specimen of the second species to C. De Candolle for comparison with Otto's specimen of *M. lanceolata*. C. De Candolle replied that the specimens did not match but there is no evidence as to what material was sent. Aware of this, Cheel applied the name *M. lanceolata* to the species identified by Baker and Smith as *M. genistifolia* and correctly used *M. decora* (Salisb.) Britten for the other. De Candolle's diagnosis does not well apply to either species and his reference to "Otto hort. berol. 36" copied into Index Kewensis proved hard to trace. A clue was provided by Schauer's reference to "*M. canescens* Otto, in Horis phys. Berol. pag. 37" in Pl. Preiss. 1: 142 (1844) in the synonymy of *M. incana* R. Br. The reference is to an article by Otto: "Plantae rariores, quae in horto regio Berolinensi a mense Januario ad ultimum Majum anno 1819 floruerunt" in "Horae physicae Berolinenses collectae ex symbolis virorum doctorum . . ." edited by Nees von Esenbeck and published in 1820 (see Pritzel, Thesaurus, p. 363, item 10769). A copy of the pertinent passage from the volume in the Kew Library was obtained through the courtesy of the Director.

De Candolle's account is very similar to that of Otto except for the omission of measurements. Otto gave the size of the leaves as "4–6 pollices longa, unum lata"; Link, Enum. Pl. Hort. Berol. 2: 272 (1822) altered "pollices" to "lin.". Through the courtesy of Dr. Baehni a photograph of Otto's material in the De Candolle Prodrum herbarium is now at Brisbane and this shows a plant very like *M. pubescens* with which species Otto's account with Link's corrected measurements agrees. There are two pieces on the sheet with two labels written up by Otto as "*Melaleuca lanceolata* mihi"; on one he also wrote "*M. thymifolia* H. Paris". On both De Candolle has written "Jard. de Berlin Mis Otto 1826". The specimens must have been taken from plants growing in the Berlin Botanic Gardens. Otto had visited Kew and had been given seed of many species (Link, Hort. Berol. Praef. vii (1821)) and it is possible that some were from the collections of R. Brown and Cunningham. The "H. Paris" on one of the labels may mean that Otto had received seed from Paris under this name from which the plant concerned was raised or he may have identified it with material so labelled growing in Paris; this piece is sterile. The other piece, in flower, is closely matched by *White* 8243 (BRI). Some characters could not be ascertained from the photograph so a piece of *White* 8243 was sent to Geneva for comparison. Dr. Baehni reported a very close agreement between the two specimens and in

answer to specific questions he stated that the petiole is shorter than the width of the blade, the petals are reflexed and inrolled along their length above a prominent claw, the staminal bundles have a short broad claw about 1 mm long, shorter than the petals with 8–13 filaments and the style is glabrous. I saw the specimen later, in 1964. There can be no doubt that *M. lanceolata* Otto is conspecific with *M. pubescens* and its name has priority. It was stated to be the correct name for the species by Blake & Roff, Honey Fl. SE. Qd 117 (1959) but no explanation was given. *M. lanceolata* R. Br. ex R. T. Baker (1914) is *M. deanei*. The type of *M. curvifolia* has recurved leaves but many specimens have at least some of the leaves recurved to a more or less extent. In the past *M. parviflora* Lindl. Swan R. App. 8 (1839) has also been used for *M. lanceolata* and *M. preissiana* and Benth identified it with *M. preissiana* var. *leiostachya* Benth. The inclusion of *M. preissiana* var. *leiostachya* by Bailey in Qd Fl. 2: 602, etc., must be based on Mueller's determination of a specimen of *M. sieberi* (Bailey 3, MEL) as *M. parviflora* Lindl. However, *M. parviflora* is distinct from both and according to a note by V. S. Summerhayes on the type sheet (CGE, photo BRI) is the same as *M. laxiflora* Turcz. (*M. crassifolia* Benth.). *M. parviflora* Lindl. is a later homonym of *M. parviflora* Reichb. (1837).

In the Bernhardt Herbarium (MO) there is a sheet of specimens apparently from plants in cultivation in Europe in the early part of the last century. There are four labels each bearing a name only: "*Melaleuca gnidiaefolia*"; "*Melaleuca thymifolia*"; "*Melaleuca lanceolata* Otto *imbricata* H. Goett."; and "*Mela thymifolia*" with "*lanceolata*" written across it; possibly one of these pieces is an isotype or at least from the type tree, but it is not possible to determine to which pieces the labels belong.

Some plants produce only male flowers.

- 15. *Melaleuca preissiana*** Schau. Pl. Preiss. 1: 143 (1844). Syntypes: *Preiss* 265 (isosyntypes, MO, MEL), *Drummond* (not seen). Lectotype coll., *Preiss* 265.

A species of south-west Western Australia (fig. 26) resembling *M. lanceolata* in its general habit with many small narrow leaves, narrow,  $\pm$  pubescent often  $\pm$  leafy spikes with many of the flowers in two's and three's, herbaceous triangular sepals pubescent inside with rounded tips, and reflexed  $\pm$  inrolled petals, but it differs in its whitish papery bark, leaf-blades (1–2 mm wide) with nearly parallel sides and muticous more or less callous tip, petioles (1–1.5 mm long) often as long as the width of the blades, petals with a broader claw, and 15–30 stamens in each bundle the claw of which is 2–2.5 mm long bearing filaments to below the middle. In the protologue Drummond's collection was cited more or less incidentally so that *Preiss* 265 should be taken as lectotype.



16. *Melaleuca bracteata* F. Muell. Fragm. 1: 15 (1858). Type: Moreton Bay *W. Hill*; lectotype, MEL.

*Melaleuca glaucocalyx* Gandoger, Bull. Soc. Bot. France 65:26 (1918), *syn. nov.* Type: Murwillumbah, Oct. 1893, *Forsyth* (holotype, LY, photo BRI; isotypes BRI, NSW).

*Melaleuca genistifolia* Sm. var. *coriacea* Ewart, Kerr & Derrick, Proc. Roy. Soc. Vict. ser. II, 38: 84 (1926), *syn. nov.* Syntypes: Finke R., *Kempe* 431 (MEL), Arltunga, Aug. 1924, *Ewart* (MEL?).

*Melaleuca daleana* Blakely, Aust. Nat. 11: 9 (1941), *syn. nov.* Type: Connor's Well, C.A., Oct. 1939, *Dale* (holotype, NSW).

*Melaleuca monticola* J. M. Black, Trans. Roy. Soc. S. Aust. 58: 179 (1934), *syn. nov.* Syntypes: Near Ernabella, Aug. 1933, *Cleland* (AD), Glen Ferdinand, July 1914, *S. A. White* (AD).

Tree up to 15 m or shrubby and as low as 2 m, with dark grey fissured bark; young shoots pubescent to densely pubescent with longer and shorter hairs, the indumentum persisting or the older parts glabrescent; twigs terete with usually 15–30 leaves or more. Leaves scattered, pilose pubescent to glabrous, copiously dotted, sessile, very narrowly elliptic-lanceolate from a relatively broad base  $\pm$  0.7 mm wide, acute or acutely acuminate, flat or somewhat concave sometimes excurved upwards, often  $\pm$  twisted, with thickened margins, 5–7-nerved, the outermost pair of nerves confluent with the margins towards the tip, the nerves often faint or concealed in the tissues,  $\pm$  7–15 mm long, 1–2 mm wide, 4–9 times as long as wide. Inflorescence spiciform; spikes at first terminal or also in the upper axils but the axis soon growing out, 0.5–2.5 cm long,  $\pm$  1.5 cm wide, sometimes reduced to very few flowers, often leafy; axis pubescent 0.5–0.7 mm thick. Flowers mostly in triads or pairs or some solitary ones added, each pair or triad in the axil of a  $\pm$  persistent ovate leaf-like bract and each flower with a pair of small persistent bracteoles. Calyx pubescent-tomentose outside, glabrous inside, 1.8–3 mm long; tube shortly cylindric to globose-urceolate, 1.3–2 mm long, 1.4–1.8 mm wide; sepals stiffly herbaceous, triangular, very acute or apiculate, about half as long as the tube, 0.7–1.5 mm long, 0.9–1.1 mm wide, 3–5-nerved, the midnerve percurrent and sometimes excurrent as a small point. Petals glabrous, broadly ovate, concave, sessile (not clawed), with one prominent percurrent vein and a few punctiform glands, about 1.8–2 mm long, about 1.5 mm wide. Staminal bundles 5–7 mm long, glabrous; claw narrowly oblong, 2.5–4 mm long, with 13–25 filaments along the margins from about the middle, 2-seriate at the end; anthers subquadrate to somewhat elliptical or obovate, 0.25–0.4 mm long; style glabrous; ovary free for about half its height, in the lower half of calyx tube; ovules many on a broad subelliptic or round, bifid,  $\pm$  peltate, basal placenta. Fruit shortly cylindrical to subglobose, rounded at base, crowned by the persistent sepals, excluding the latter 2–2.5 mm long and almost as wide to slightly wider; capsule enclosed.

WESTERN AUSTRALIA.—Northern Province.

NORTHERN TERRITORY.—Greater part.

SOUTH AUSTRALIA.—North West.

QUEENSLAND.—Nearly throughout except for extreme south-west.

NEW SOUTH WALES.—North Coast to North-West Slopes and Western Plains.

JAVA.—Cultivated.

CALIFORNIA.—Cultivated.

One of the most widely spread species of the genus in Australia (fig. 26), it is found as a large tree along streams in eastern Queensland becoming low and shrubby in depressions on "black soil" inland, and in central Australia on rocky places as low as 2 m.

The type of *M. bracteata* is not at Kew according to C. T. White, MS, and should be at Melbourne but no specimen was found labelled as such by Mueller or with Hill's name as collector. There is one sheet, ex. herb. Sonder written up by Sonder as "*Melaleuca bracteata* F. Muell./New South Wales/ded. Dr. Ferd. Müller". The species was described while "Moreton Bay" was still part of New South Wales so no importance need be attached to this. Since the specimen was sent by Mueller to Sonder apparently as *M. bracteata* it may be taken as part of the type collection and is nominated as lectotype.

Two lines appear to have been transposed in the protologue of *M. genistifolia* var. *coriacea*, so that of two collections, Kempe 431 appears to be referred to *M. genistifolia* and Ewart's specimen to var. *coriacea*. All the material (MEL) is on one sheet and could belong to one collection with labels for both; Ewart has written "var. *coriacea* n. var." on a label for Kempe's collection on which Mueller had previously written "*Melaleuca genistifolia* Sm. var."

The species was identified with *M. genistifolia* (*M. decora*) by Bentham and others who followed him but it differs decidedly from this in the rough and fissured not papery bark, sessile leaves with commonly 5 or more nerves (sometimes not visible when the leaves are thick), rigid 3–5-nerved sepals, sessile petals and glabrous style. The prominent persistent bracts and bracteoles are noteworthy. At first sight the inland specimens (*M. monticola*, *M. daleana*, *M. genistifolia* var. *coriacea*) look different from some of the coastal specimens because of conspicuous indumentum and mostly thicker shorter and therefore relatively broader leaves in which the veins tend to be concealed, but the characters vary independently of one another and of geographical distribution. Some herbarium material is much more like that of *M. styphelioides* Sm. than of *M. decora* but *M. styphelioides* has papery bark like *M. decora*, mostly larger leaves and flowers and the leaves have usually 11 or more nerves without an intramarginal one, all the nerves reaching the commonly scabrid margins.

17. **Melaleuca decora** (Salisb.) J. Britten, J. Bot. 54: 62 (1916); Domin, Biblioth. Bot. 89: 457 (1928). Based on *Metrosideros decora*.

*Metrosideros decora* Salisb. Prodr. 352 (1796). Type: near Port Jackson, David Burton (not seen).

*Melaleuca genistifolia* Sm. Trans. Linn. Soc. 3: 277 (1797). Type: Port Jackson, David Burton (LINN, not seen).

*Myrtroleucodendron genistifolium* (Sm.) O. Kuntze, Rev. Gen. Pl. 1: 241 (1891). Based on *Melaleuca genistifolia*.

Shrub or bushy-headed tree to 15 m with whitish many-layered papery bark; young shoots  $\pm$  pubescent; twigs with about 15–40 leaves. Leaves scattered, obliquely erect or  $\pm$  spreading, linear-lanceolate, acute, narrowed to a very short petiole 0.75–0.9 mm long, straight,  $\pm$  concave on top, with a definite midrib, sometimes 3-nerved, dotted or not, 8–16 mm long, 1.3–2 mm wide. Spikes 2–6 cm long, about 1.5 cm wide, sometimes interrupted and leafy, at first terminal or also in the upper axils; axis pubescent, 0.5–0.7 mm thick, soon growing out. Flowers in alternate pairs or triads or an occasional solitary one interspersed. Calyx 2.5–3 mm long; tube campanulate-urceolate,  $\pm$  pubescent in lower part, glabrous upwards, 1.8–2.2 mm long, about 1.6–1.8 mm wide; sepals firmly herbaceous, deltate, 1-nerved, ciliolate,  $\pm$  0.8–1 mm long and wide. Petals inrolled along their length and reflexed when dry, 1-nerved with a few punctiform glands, when expanded about 2–2.5 mm long and wide with a very broadly ovate concave basally auriculate lamina and a short cuneate claw about 0.8–0.9 mm long. Staminal bundles 5–8 mm long; filaments 20–30 in each along the greater part of the margin and on the upper surface towards the end of a narrow claw 2–3 mm long; anthers 0.25 mm long. Style pubescent all along; ovules very numerous on a peltate placenta. Fruit broadly ellipsoid truncate with a narrow base, rugose, about 3 mm long, 3–3.5 mm wide, the orifice 2–2.5 mm wide; capsule deeply enclosed. Fig. 24.

QUEENSLAND.—Darling Downs and Moreton Districts.

NEW SOUTH WALES.—North Coast and Central Coast.

*Melaleuca decora* is fairly easily distinguished by the combination of small alternate leaves narrowed to a very short petiole, flowers in alternate pairs or triads along the axis and a pubescent style. The only other spicate species with a hairy style is *M. lasiandra* which also has the flowers in triads, but the latter has hairy stamens as well and the leaves are much larger.

*Metrosideros decora* and *Melaleuca genistifolia* may have been founded on the same collection, perhaps even on the same specimen. Sm. Exot. Bot. 1: t. 55 (1805) may have been drawn from type material, but the disposition of the filaments in the bundle is not correctly shown though the habit, leaf, petal and hairy style certainly agree with the species. Domin made the combination

*Melaleuca decora* independently of Britten, but he cited *M. bracteata* as a synonym and all the specimens he cited must belong to the latter. As mentioned elsewhere, Baker and Smith misapplied the name *Melaleuca genistifolia* to *M. sieberi*.

- 18. *Melaleuca lasiandra*** F. Muell. Fragm. 3: 115 (1862). Syntypes: Fitzmaurice R., Oct. 1855, *Mueller* and Victoria R., Jan.-May 1856, *Mueller* (MEL, K).

*Melaleuca loguei* W. V. Fitzg. J. Roy. Soc. W. Aust. 3: 188 (1918), *syn. nov.* Type: S. of Fitzroy R., W. A., Sept. 1906, *W. V. Fitzgerald* (NSW).

Shrub or small tree mostly 1-3.5 m high with whitish many-layered papery bark. Bud-scales small, up to 5 mm long, about 1-nerved, silky hairy. Young shoots silky with straight mostly appressed hairs. Twigs pubescent with  $\pm$  spreading hairs and about 12-21 leaves. Leaves scattered,  $\pm$  silky-hoary, the indumentum long persistent; petioles compressed, 1-2.5 mm long, 0.8-1 mm wide, straight; blades thick, stiffly coriaceous, oblanceolate to linear-elliptic, straight or oblique, obtuse, acute or cuspidate-acuminate, gradually narrowed to the petiole from about the middle, 1.2-4.5 cm long, 0.2-0.7 cm wide, 4-(5-7)-9 times as long as wide, 3-nerved or rarely 1-nerved when very narrow, the nerves not prominent  $\pm$  0.3 mm wide, reticulations often obscure, not dotted. Spikes terminal, 1-3 together, 2-4 cm long, about 1.2 cm wide, rather densely flowered, with the flowers in triads; rhachis 1 mm thick, densely pubescent with spreading hairs up to 0.5 mm long. Calyx 2.5-3 mm long; tube 2-2.2 mm long, 2 mm wide, somewhat turbinate, densely pubescent with spreading hairs outside, pubescent inside; sepals deltate acute, 1-1.2 mm long and wide or slightly wider, thick without any thin margin, pubescent throughout, appressedly so within, soon deciduous. Petals early deciduous, brownish scarious, subcircular, concave, sessile or subsessile, about 2-2.2 mm diam., 1-nerved, glabrous or  $\pm$  pubescent, with a few circular or elliptic glands. Staminal bundles 5-9 mm long, claw 2.7-3 mm long; filaments 8-19, pinnately arranged, pubescent below; anthers suborbicular, 0.4-0.5 mm long. Ovary reaching nearly to the top of the calyx-tube; style pubescent, thickened downwards, about 6 mm long; stigma slightly wider than upper part of style. Fruit cup-shaped to shortly cylindrical, about 2.5-3 mm long and 3.5 mm wide.

WESTERN AUSTRALIA.—NORTHERN PROVINCE: Nalgi Stn., 80-mile Beach, June 1941, *Burbridge* 1257; S. of Fitzroy R., Sept., 1906, *W. V. Fitzgerald*;  $\pm$  45 miles W. of Tableland Stn., July 1959, *Lazarides* 6428; 20 miles NE. Ord River Stn., July 1949, *Perry* 2401; 5 miles SE. of Gordon Downs Stn., July 1949, *Perry* 2460.

NORTHERN TERRITORY.—DARWIN AND GULF DISTRICT: Fitzmaurice R., Oct. 1855, *F. Mueller*. VICTORIA RIVER DISTRICT: Victoria R., Jan. and May 1856, *F. Mueller*; 20 miles SW. of Auvergne Stn., Aug. 1949, *Perry* 2683. BARKLY TABLELAND DISTRICT: 10 miles S. of Tennant Creek, Mar. 1955, *Winkworth* 997; 22 miles E. of Frewena Stn., Apr. 1948, *Perry* 671; about SSW. of Alroy Downs Stn., 19° 40' S., 135° 44' E., 220 m, May 1947, *Blake* 17895. ALICE SPRINGS DISTRICT: 8 miles NW. of The Granites, Apr. 1957, *Lazarides* 6241; The

Granites, Aug. 1936, *Cleland*; W. of Lander's Ck., June 1911, *Hill* 340; 8 miles N. of Wauchope, Mar. 1958, *Eddy in NT*. 5289; 15 miles SE. Newlands Bore, Elkedra Stn., May 1955, *Chippendale in NT*. 1192; near Stirling Bore, 20 miles S. of Barrow Creek, May 1952, *Perry* 2719; Vaughan Springs, July 1954, *Winkworth* 417; Vaughan Springs, Feb. 1955, *Chippendale in NT*. 1232; 40 miles NNW. Meyers Hill, May 1911, *Hill* 238.

QUEENSLAND.—GREGORY NORTH DISTRICT: Oban Stn., near Woodend Bore, Dec. 1947, *Everist* 3340.

Found usually as a dwarf shrubby tree in deep sand or red loam in desert scrub or near streams, mostly in arid regions (fig. 25). *Winkworth* 4117 was from a rocky gully. *Hill* 238 was from a tree "up to 30 ft."

*M. lasiandra* is quite distinct from *M. leucadendron* and its immediate allies because of its small, not striate bud-scales; many, small, 3-1-nerved leaves; scarious, 1-nerved, subsessile petals; pubescent, more numerous, short filaments on claws longer than the petals; and the top of the ovary nearly level with the top of the calyx-tube. It is included in this paper because it was placed close to *M. leucadendron* by Bentham and because specimens of *M. stenostachya* were at first identified as *M. lasiandra* and some specimens may have been distributed under that name.

In the protologue, the localities given are "Ad flumina Victoria et Fitzroy River in plagis apricis". It would seem that Fitzroy is a mistake for Fitzmaurice. In herb. Melbourne are two sheets, one in fruit from the Fitzmaurice River, Oct. 1855 and another from Victoria River, "Jan. and May" 1856.

*M. loguei* was based on fruiting specimens; the type locality is not far from that of *M. lasiandra*.

## VII. HYBRIDS

As mentioned previously, opportunities for hybridism between species appear to be common but only a few examples of suspected hybrids have been found. They are:—

1. *M. leucadendron* x *M. argentea*: *Blake* 19933 from Rockhampton. The single tree had smaller and narrower leaves than the trees of *M. leucadendron* near which it was growing, mostly 7-12 cm long, 8-13 mm wide, with a leaf index of 9-11 which is well within the range of both species. The leaves on the specimens collected (all mature) are glabrous, but the axis of the inflorescence and the calyx are shortly pubescent with hairs up to 0.5 mm long; the longer hairs are ascending, but some of the shorter hairs are  $\pm$  erect and some are curved or gently flexuous, not so distinctly dimorphic as in *M. argentea*. The petioles, 6-9 mm long, 1.1-1.3 mm wide are well within the extremes of both species, both as to length and breadth. The texture of the blades is thinner than that of *M. argentea*, the width of the veins (0.2-0.35 mm) extending over the

range of both species. The inflorescence is 3 cm wide, intermediate between that of *M. leucadendron* (2.2–3 cm) and *M. argentea* (3–4.5 cm) with the staminal bundles 10–11.5 mm long (10–13 and 12–20 in the presumed parents). The calyx-tube is about 2.5 mm long, shortly pubescent inside and out with the sepals sparsely pubescent inside and out, glandular nearly throughout, gradually thinning to a very narrow scarious marginal band different from the relatively broad scarious (glabrous) band of *M. leucadendron*. The specimens differ from those of  $\pm$  glabrescent states of *M. argentea* in the thinner texture of the leaves, the rather smaller flowers, and the calyx lobes not about equally thick almost to the margin. The ovules in one flower were not well developed. No fruits were found.

*M. argentea* was not actually observed close by, but is known to occur in the neighbourhood. In any case, seed could have been deposited by floods, both the presumed parents being rheophytes.

In September 1950 another apparently hybrid individual was observed SW. of Ayr associated with and intermediate in appearance between these two species. The tree was sterile and no specimens were collected.

2. *M. nervosa* x *M. stenostachya*. BURKE DISTRICT: 17 miles SE. Croydon, July 1954, Blake 19578. Two trees seen along a shallow gully in a community of *Melaleuca acacioides* F. Muell., with *M. stenostachya* common nearby and *M. nervosa* not far away. The size and shape of leaf, width of principal veins, thickness of axis of inflorescence, shape of sepals and size of petals and anthers on the specimens are intermediate between those of the presumed parent species, but the staminal bundles are 17–18 mm long with usually 3, rarely 4–5 filaments, resembling those of *M. nervosa* more than *M. stenostachya*. The parents and hybrid resemble one another in the texture of the sepals and the round glands of the petals. The indumentum includes short crisped hairs as in *M. nervosa*, but the longer hairs are less spreading, more like those of *M. stenostachya*. No fruits were found.

3. *M. quinquenervia* x *M. viridiflora*. Dovey 87 from Rosedale, Queensland, may represent such a hybrid having longer leaves (to 15 cm x 2 cm) and petioles (to 1.2 cm) than are usual in *M. quinquenervia* although the young shoots have some spreading hairs as in this species. The specimen is in fruit with a coppice shoot and not entirely satisfying; from the collector's notes the tree from which the material came was one of a community. Ridley QCC.350 from near Woodgate has leaves intermediate in appearance between the two species, with relatively long but narrow petioles about 7 x 1.5–1.8 mm; the young growth, axis and calyx-tube are densely silky without spreading hairs, the calyx-tube a little longer than wide; there are only a few long-withered flowers with staminal bundles shorter than those of *M. viridiflora*, but it is not possible to be sure of their length before they withered; well-developed fruits are present.

## VIII. INDEX OF NAMES

In the following list, all names traced that had any bearing on the nomenclature of *Melaleuca leucadendron* and its allies are arranged in alphabetical order of genera, species and varieties. Names accepted as correct are in bold face followed by the number indicating the order in which they are treated in this paper. Misapplications are shown with a reference to the species to which the name was misapplied. The letter "M" stands for *Melaleuca* throughout.

*Arbor alba* Rumph. Herb. Amboin. 2: 72 (1750). **M. leucadendron**, 1.

*Arbor alba minor* Rumph. Herb. Amboin. 2: 76 (1750). **M. cajuputi**, 2.

*Cajuputi*

*leucadendra* ("Stickmann") Rusby, U.S. Dept. Agric. Bur. Pl. Int. Bull. 248: 42 (1912). *M. leucadendron*, 1.

*pubescens* (Schau.) Skeels, U.S. Dept. Agric. Bur. Pl. Indust. Bull. 242: 41 (1912). *M. lanceolata*, 14.

*Callistemon*

*nervosus* Lindl. in Mitch. Trop. Aust. 235 (1848) ("*nervosum*").—*M. nervosa*, 6.

*Eucalyptus*

*cochinchinensis* Hort. ex C. B. Robinson in Maiden, Crit. Rev. Genus Eucalyptus 5: 183 (1921), nomen.—*M. cajuputi*, 2.

*Leptospermum*

*leucadendron* (L.) J. R. & G. Forst. Char. Gen. 72 (1776).—*M. leucadendron*, 1.

*speciosum* Schau. in Walp. Repert. Bot. Syst. 2: 923 (1843).—*Leptospermum speciosum*. See under *M. deanei*, 11.

**Melaleuca**

*amboinensis* Gandoger, Bull. Soc. Bot. France 65: 26 (1918).—*M. leucadendron*, 1.

*angustifolia* (Bl.) Bl. Mus. Bot. Lugd. Bat. 1: 83 (1849); non Gaertn.—*M. cajuputi*, 2.

*arcana* S. T. Blake, 10.

*argentea* W. V. Fitzg. Western Mail (Perth) 16 June 1906, et J. Roy. Soc. W. Aust. 3: 187 (1918), 7.

*bracteata* F. Muell. Fragm. 1: 15 (1858), 16.

*caja-putti* Hort. ex DC. Prodr. 3: 215 (1828).—*M. squarrosa* Donn. See under *M. cajuputi*, 2.

***cajuputi*** Powell, Pharm, Lond. Transl. 22 (1809), 2.

*commutata* Miq. Anal. Bot. Ind. 14 (1850).—*M. cajuputi*, 2.

*crosslandiana* W. V. Fitzg. Western Mail (Perth) 2 June 1906, et J. Roy. Soc. W. Aust. 3: 186 (1918).—*M. nervosa*, 6.

*cunningiana* Turcz. Bull. Soc. Imp. Nat. Mosc. 20: 164 (1847).—*M. cajuputi*, 2.

*cunninghamii* Schau. in Walp. Repert. Bot. Syst. 2: 927 (1843).—*M. viridiflora*, 4.  
var. *glabra* C. T. White, J. Arnold Arb. 23: 87 (1942). *M. quinquenervia*, 3.

*curvifolia* Schlechtendahl, Linnaea, 20: 654 (1847).—*M. lanceolata*, 14.

*daleana* Blakely, Austr. Nat. 11: 9 (1941).—*M. bracteata*, 16.

*deanei* F. Muell. Proc. Linn. Soc. N.S.W. ser. II, 1: 1106 (1887), 11.



**dealbata** S. T. Blake, 5.

**decora** (Salisb.) J. Britten, J. Bot. 54: 62 (1916), 17.

*eriorhachis* Gandoger, Bull. Soc. Bot. France 65: 26 (1918). — *M. cajuputi*, 2.

*genistifolia* Sm. Trans. Linn. Soc. 3: 277 (1797). — *M. decora*, 17.

var. *coriacea* Ewart, Kerr & Derrick, Proc. Roy. Soc. Vict. ser. II, 38: 84 (1926). — *M. bracteata*, 16.

*glauca* R. Br. ex Domin, Biblioth. Bot. 89: 457 (1928) pro syn. — *M. deanei*, 11.

*glaucocalyx* Gandoger, Bull. Soc. Bot. France 65: 26 (1918). — *M. bracteata*, 16.

**groveana** Cheel & White, Proc. Roy. Soc. Qd 36: 41 (1924), 12.

**lanceolata** Otto, Horae Phys. Berol. 36 (1820), 14.

*lanceolata* R. Br. ex Benth. Fl. Aust. 3: 143 (1867) in syn.; ex R. T. Baker, Proc. Linn. Soc. N.S.W. 38: 601 (1914). — *M. deanei*, 11.

*lancifolia* Turcz. Bull. Soc. Imp. Nat. Mosc. 20: 164 (1847). — *M. cajuputi*, 2.

**laslandra** F. Muell. Fragm. 3: 115 (1862), 18.

*latifolia* Raeusch. Nom., ed. 3: 142 (1797). See under *M. leucadendron*, 1.

**leucadendron** (L.) L. Mant. 1: 105 (1767), 1.

var. *albida* Cheel in Ewart & Davies, Fl. North. Territ. 301 (1917). — *M. quinquenervia*, 3.

var. *albida* Cheel forma *ruscifolia* Cheel in Ewart & Davies, Fl. North. Territ. 302 (1917). — *M. arcana*, 10.

var. *angusta* Rivière, Bull. Soc. Nat. Acclim. France III, 9: 537 (1882). — *M. argentea*, 7.

var. *angustifolia* L. f. Suppl. Pl. 342 (1781). — *M. quinquenervia*, 3.

var. *cajuputi* ("Roxb.") Niedenzu, Natürl. Pfl.-fam. IV. 3 (7): 95 (1893); ("Roxb.") Hegi, Fl. Mit. Eur. 5: 787 (1925) (both "*cajuputi*"). — *M. cajuputi*, 2.

var. *coriacea* (Poir.) Cheel in Ewart & Davies, Fl. North. Territ. 297 (1917). — *M. quinquenervia*, 3; misapplied to *M. nervosa*, 6.

var. *coriacea* (Poir.) Cheel forma *crosslandiana* (W. V. Fitzg.) Cheel in Ewart & Davies, Fl. North. Territ. 298 (1917). — *M. nervosa*, 6.

var. *cunninghamii* (Schau.) F. M. Bail. Syn. Qd Fl. 171 (1883). — *M. viridiflora*, 4.

var. *lancifolia* (Turcz.) F. M. Bail. Syn. Qd Fl. 170 (1883). — *M. cajuputi*, 2; misapplied by Bailey to *M. quinquenervia*, 3.

var. *vel* forma *latifolia* Guillaumin, Bull. Soc. Bot. France 81: 6 (1934). — *M. quinquenervia*, 3.

var. *latifolia* L. f. Suppl. Pl. 342 (1781). — *M. leucadendron*, 1.

var. *latifolia* Rivière, Bull. Soc. Nat. Acclim. France ser. III, 9: 537 (1882). — *M. viridiflora*, 4.

var. *leptospermum* Cheel in Ewart & Davies, Fl. North. Territ. 294 (1917); probably a slip of the pen for var. *saligna*.

var. *minosoides* (A. Cunn. ex Schau.) Cheel in Ewart & Davies, Fl. North. Territ. 295 (1917). — *M. leucadendron*, 1.

var. *minor* Hort. ex Hall in L. H. Bail. Standard Cyclop. Hort. 4: 2022 (1916). — See under *M. cajuputi*, 2.

var. *minor* (Sm.) Duthie in Hook. f. Fl. Brit. Ind. 2: 465 (1878); (Sm.) Niedenzu, Natürl. Pfl.-fam. IV. 3 (7): 95 (1893); (Sm.) Cheel in Ewart & Davies, Fl. North. Territ. 299 (1917); (Sm.) Hegi, Fl. Mit. Eur. 5: 787 (1925). — *M. cajuputi*, 2; misapplied by Cheel to *M. nervosa*, 6.

var. *vel* forma *nana* Brong. & Gris ex Guillaumin, Bull. Soc. Bot. France 81: 6 (1934). — *M. quinquenervia*, 3.

var. *nervosa* (Lindl.) Domin, Biblioth. Bot. 89: 457 (1928). — *M. nervosa*, 6.

- var. *parvifolia* Benth. Fl. Aust. 3: 143 (1867).—*M. deanei*, 11, and *M. nervosa*, 6.  
 var. *rubriflora* (Brong. & Gris) Guillaumin, Ann. Mus. Col. Marseille 19: 73 (1911).  
 — *M. quinquenervia*, 3.  
 var. *saligna* (Schau.) F. M. Bail. Syn. Qd Fl. 170 (1883).—*M. saligna*, 9; misapplied to *M. leucadendron*, 1.  
 var. *saligna* (Schau.) Cheel in Ewart & Davies, Fl. North. Territ. 296 (1917).—*M. saligna*, 9; misapplied to *M. argentea*, 7.  
 var. *saligna* (Schau.) Domin, Biblioth. Bot. 89: 456 (1928).—*M. saligna*, 9; misapplied to *M. leucadendron*, 1.  
 var. *sanguinea* Cheel in Ewart & Davies, Fl. North. Territ. 296 (1917).—*M. viridiflora*, 4.  
 var. *speciosa* (Schau.) Domin, Biblioth. Bot. 89: 457 (1928).—*Leptospermum speciosum*. See under *M. deanei*, 11.  
 var. *viridiflora* (Sol. ex Gaertn.) Cheel in Ewart & Davies, Fl. North. Territ. 299 (1917).—*M. viridiflora*, 4; misapplied to *M. quinquenervia*, 3.  
*loguei* W. V. Fitzg. J. Roy. Soc. W. Aust. 3: 188 (1918).—*M. lasiandra*, 18.  
*maidenii* R. T. Baker ex Baker & Smith, J. & Proc. Roy. Soc. N.S.W. 47: 201 (Feb. 1914);  
 R. T. Baker, Proc. Linn. Soc. N.S.W. 38: 598 (March 1914).—*M. quinquenervia*, 3.  
*mimosoides* A. Cunn. ex Schau. in Walp. Repert. Bot. Syst. 2: 927 (1843).—*M. leucadendron*, 1.  
*minor* Sm. in Rees, Cyclop. 23, No. 2 (1812).—*M. cajuputi*, 2.  
*monticola* J. M. Black, Trans. Roy. Soc. S. Aust. 58: 179 (1934).—*M. bracteata*, 16.  
*nervosa* (Lindl.) Cheel, J. & Proc. Roy. Soc. N.S.W. 78: 65 (1944), 6.  
*nervosa* Hort. ex Link, Enum. Hort. Berol. 2: 25 (1822) in syn.—See under *M. nervosa* (Lindl.) Cheel, 6.  
*parviflora* Lindl. Swan R. App. 8 (1839).—*M. laxiflora*; see under *M. lanceolata*, 14.  
 var. *latifolia* Maiden & Betche, Census N.S.W. Pl. 155, 156 (1916).—*M. sieberi*, 13.  
 var. *pubescens* (Schau.) Domin, Biblioth. Bot. 89: 457 (1928).—*M. lanceolata*, 14.  
*preissiana* Schau. Pl. Preiss. 1: 143 (1844), 15.  
 var. *leiostachya* Benth. Fl. Aust. 3: 145 (1867).—*M. laxiflora*; see under *M. lanceolata*, 14.  
*pubescens* Schau. in Walp. Repert. Bot. Syst. 2: 928 (1843).—*M. lanceolata*, 14.  
*quinquenervia* (Cav.) S. T. Blake, Proc. Roy. Soc. Qd 69: 76 (1958), 3.  
*rubriflora* Vieill. ex Brong. & Gris, Bull. Soc. Bot. France 11: 183 (1864) in syn.—*M. quinquenervia*, 3.  
*ruscifolia* Sol. ex Cheel in Ewart & Davies, Fl. North. Territ. 302 (1917), in syn.—*M. arcana*, 10.  
*saligna* (Gmel.) Bl. Mus. Bot. Lugd. Bat. 1: 66 (1849).—*M. cajuputi*, 2.  
*saligna* Schau. in Walp. Repert. Bot. Syst. 2: 927 (1843).—*M. saligna*, 9; misapplied to *M. argentea*, 7.  
*sanguinea* Sol. ex Cheel in Ewart & Davies, Fl. North. Territ. 296 (1917) in syn.—*M. viridiflora*, 4.  
*sieberi* Schau. in Walp. Repert. Bot. Syst. 2: 928 (1843), 13.  
*smithii* R. T. Baker, Proc. Linn. Soc. N.S.W. 38: 599 (1914).—*M. quinquenervia*, 3.  
*stenostachya* S. T. Blake, 8.  
 ? *trinervia* White, Journ. Voy. N.S.W. App. 229, t. 24 (1790).—*Leptospermum* sp.; see under *M. cajuputi*, 2.  
*preissiana* Schau. Pl. Preiss. 1: 143 (1844), 15.

*trinervis* Buch.-Ham. Mem. Wern. Soc. 6: 302 (1832) in obs., et ex Henschel, Vita Rumph. 132 (1833).—*M. cajuputi*, 2.

*viridiflora* Sol. ex Gaertn. Fruct. 1: 173, t. 35 (1788), 4; misapplied to *M. quinquenervia*, 3.  
var. *angustifolia* Bl. Bijdr. 1099 (1826).—*M. cajuputi*, 2.

var. *rubriflora* Brong. & Gris, Bull. Soc. Bot. France 11: 183 (1864).—*M. quinquenervia*, 3.

#### *Metrosideros*

*albida* Sieb. ex Spreng. Syst. Cur. Post. 194 (1827) in syn., et ex DC. Prodr. 3: 212 (1828) in syn.—*M. quinquenervia*, 3.

*coriacea* Salisb. Prodr. 352 (1796).—*Eucalyptus capitellata* Sm. See under *M. quinquenervia*, 3.

*coriacea* Poir. Encycl. Suppl. 3: 685 (1813).—*M. quinquenervia*, 3.

*decora* Salisb. Prodr. 352 (1796).—*M. decora*, 17.

*quinquenervia* Cav. Ic. et Descript. Pl. 4: 19, t. 333 (1797).—*M. quinquenervia*, 3.

*saligna* Sm. Trans. Linn. Soc. 3: 272 (1797).—*Callistemon salignus* (Sm.) DC. See under *M. cajuputi*, 2.

#### *Myrtoleucodendron*

*deanei* (F. Muell.) O. Kuntze, Rev. Gen. Pl. 1: 241 (1891).—*M. deanei*, 11.

*genistifolium* (Sm.) O. Kuntze, Rev. Gen. Pl. 1: 241 (1891).—*M. decora*, 17.

*viridiflorum* (Sol. ex Gaertn.) O. Kuntze, Rev. Gen. Pl. 1: 241 (1891).—*M. viridiflora*, 4; but applied to *M. leucadendron*, 1.

#### *Myrtus*

*leucadendra*, *baccis sessilibus urceolatis, foliis lanceolatis* L. in Stickman, Herb. Amboin. 9 (1754).—*M. leucadendron*, 1.

*leucadendron* L. Sp. Pl. ed. 2: 676 (1762) ("Leucadendra").—*M. leucadendron*, 1.

*saligna* Burm. f. Fl. Ind. 116 (1768).—*M. cajuputi*, 2.

*saligna* Gmel. Syst. 793 (1791).—*M. cajuputi*, 2.

---

## IX. INDEX OF COLLECTORS (SPECIES 1—12, 18)

Each collector's number is followed by the number of the species in parentheses. Unnumbered collections are shown by the letters "s.n." before a number in parentheses or a series of such numbers.

- Aët.—692 (1).  
d'Albertis, L. M.—s.n. (2).  
Allen, C. E. F.—446 (4), 638 (4).  
Annandale, T. N.—s.n. (2).  
Atasrip.—115 (1).  
Bailey, F. M.—2 (3), 3 (4), 4 (4), 17 (3); s.n. (3), (4).  
Bailey, J. F.—s.n. (1), (4).  
Bailey, L. H. & E. Z.—6086 (3).  
Balansa, B.—99 (3), 3279 (3).  
Bancroft, T. L.—32 (4), 34 (4), 176 (6); s.n. (1), (6).  
Banks, J., & Solander, D. C.—s.n. (3), (4), (10).  
Basedow, H.—s.n. (4).  
Bateman, W.—14 (1), 505 (4), 2031 (4); s.n. (1), (4), (5).  
Bäuerlen, W.—580 (3); s.n. (3), (4).  
Baumann-Bodenheim, M. B.—13858 (3).  
Beaulehole, A. C.—s.n. (4).  
Beccari, O.—s.n. (1).  
Beckler, H.—s.n. (3).  
Beens, L., & Spence, R.—B19 (4), LB21 (1), LB25 (1), LB28 (1).  
Berhault, R. P.—399 (3).  
Berney, F. L.—45 (7); 71 (7).  
Betcher, E.—s.n. (3), (6).  
Bisset, W. J.—s.n. (6).  
Blake, S. T.—2276 (3), 2394 (3), 6039 (7), 6310 (7), 13564 (8), 13565 (4), 13710 (4), 13711 (4), 14264 (12), 15073 (9), 15076 (1), 15339 A (5), 15986 (6), 15987 (4), 16016 (4), 16169 (1), 16344 (6), 16381 (4), 16399 (4), 16695 (7), 16753 (4), 16949 (5), 17000 (5), 17001 (2), 17002 (4), 17003 (5), 17024 (4), 17082 (6), 17101 (7), 17296 (7), 17511 (2), 17556 (4), 17895 (18), 18180 (3), 18181 (3), 18476 (3), 18643 (5), 18669 (1), 18692 (1), 18696 (5), 18949 (3), 18950 (3), 18951 (3), 18952 (3), 19210 (3), 19211 (3), 19262 (3), 19263 (5), 19264 (4), 19280 (3), 19343 (6), 19397 (7), 19428 (7), 19437 (7), 19440 (7), 19484 (6), 19563 (7), 19564 (6), 19566 (8), 19579 (4), 19607 (4), 19621 (6), 19657 (7), 19672 (5), 19673 (1), 19702 (12), 19703 (12), 19789 (3), 19918 (4), 19919 (4), 19920 (4), 19921 (7), 19932 (1), 19980 A (7), 20111 (3), 20201 (9), 20210 (4), 20211 (4), 20212 (4), 20221 (8), 20246 (3), 20260 (10), 20279 (1), 20284 (3), 20303 (6), 21732 (3), 21782 (4), 21788 (2), 21799 (9), 22087 (4), 22088 (4), 22091 (1), 22117 (1), 22393 (10), 22757 (12), 22780 (10).  
Blakely, W. F.—s.n. (3), (11).  
Blakely, W. F., & Shiress, D. W. C.—s.n. (3).  
Bleeser, F. A. K.—467 (6); s.n. (1).  
Boorman, J. L.—s.n. (1), (3), (6), (7), (11), (12).  
Borssum Waalkes, J. van—3210 (2).  
Bowman, E.—35 (1), 60 (7), 206 (6); s.n. (1), (6).  
Bradbury, E. P.—s.n. (3).  
Brass, L. J.—169 (6), 170 (4), 229 (7), 361 (6), 362 (6), 363 (8), 631 (5), 1638 (1), 2489 (4), 2494 (4), 2495 (1), 5695 (4), 5714 (4), 5814 (2), 6036 (4), 6041 (1), 6372 (2), 6548 (2), 6558 (4), 7794 (4), 7937 (4), 7938 (4), 7939 (4), 7956 (2), 8147 (2), 8247 (5), 8407 (6), 8478 (3), 8480 (3), 8485 (3), 8710 (4), 8809 (4), 8850 (7), 18350 (8), 18529 (8), 18576 (4), 18607 (4), 18613 (1), 18651 (10), 18677 (2), 18854 (2), 18976 (4), 18978 (9), 19000 (6), 19027 (4), 19477 (3), 19598 (8), 19614 (2), 19642 (1), 19673 (6), 19753 (7), 19778 (7), 19982 (6), 25165 (3), 25166 (3), 25983 (3), 27329 (3), 27330 (3), 27680 (3), 28836 (3), 32742 (3).  
Brass, L. J., & White, C. T.—87 (6).  
Bromley, N. V.—s.n. (3).  
Brown, R.—4675 (11); s.n. (1), (3), (6), (11).  
Bryan, W. W.—s.n. (6).  
Buhmann, L. C. J.—s.n. (4).  
Bünnemejer, H. A. B.—7667 (2).

- Burbidge, N. T.—1257 (18), 1457 (6).  
 Burdekin Expedition—s.n. (5).  
 Burger, D.—4 (2).  
 Burkill, I. H., in Gardens no. 169 (2).  
 Busch, C.—s.n. (3).  
 Buwalda, P.—4376 (2), 5144 (1).  
 Byerley, F. J.—s.n. (4).  
 Calvert Expedition—s.n. (6).  
 Cabbage, R. H.—448 (3), 3866 (6), 3867 (4), 3868 (7), 3897 (7), 3922 (4), 3929 (6), 3964 (6), 3967 (6).  
 Camfield, J. H.—s.n. (11).  
 Campbell, W. S.—s.n. (6), (7).  
 Cannon, D.—s.n. (3).  
 Carr, C. E.—12847 (5).  
 Carr, T.—221 (8).  
 Carter, C. E.—s.n. (4).  
 Caulfield, H. W., & Hill, R.—s.n. (6).  
 Caulfield, H. W., & Trapnell, W. G.—s.n. (3).  
 Cheel, E.—s.n. (3), (11), (12).  
 Chippendale, G., in NT—1192 (18), 1232 (18), 1539 (6), 1995 (4), 3877 (6), 5040 (7), 5046 (7), 8084 (4), 8126 (6), 8136 (4), 8218 (4), 8288 (1).  
 Chisholm, W. R.—s.n. (6).  
 Clarke, P.—s.n. (3).  
 Cleland, J. B.—s.n. (7), (18).  
 Clemens, J., & Clemens, M. S.—3971 (2), 22495 (2).  
 Clemens, M. S.—s.n. (1), (3), (4).  
 Coaldrake, J. E.—QCC.237 (4), QCC.269 (5), QCC.345 (3).  
 Cole, M. M.—507 (4), 519 (4); s.n. (6).  
 Collins, D. J.—1757 (2).  
 Compton, R. H.—15 (3).  
 Court, O. M.—40 (4), 80 (5).  
 Cumming, H.—2272 (2), 2427 (2).  
 Cunningham, A.—253/1819 (1), 254/1819 (4), 255/1819 (4), 256/1819 (9); s.n. (3), (4).  
 Cunningham, B.—s.n. (3).  
 Daemel, E.—s.n. (1), (5).  
 Dahri,—46 (2).  
 Dallachy, J.—38 (7), 309 (7), 403 (3); s.n. (1), (3), (4), (6), (7).  
 Davison, A. W.—s.n. (6).  
 Deane, H.—s.n. (3), (11).  
 Degener, O., & Hathaway, W. H., in hb. Degener—20721 (3).  
 Degener, O., & Kwan Park in hb. Degener—11014 (3).  
 Dietrich, A.—379 (4), 591 (6), 1536 (6), 1700 (6), 1983 (7), 2566 (6), 2598 (6), 2609 (5); s.n. (1), (3).  
 Dijkstra, J.—B.W. 582 (1).  
 Docker, A. D.—s.n. (4).  
 Dodd, A. P.—52 (4).  
 Dominey, C.—NGF.4205 (5).  
 Dovey, L. G.—85 (3, 6), 85A (5), 86 (5), 87 (3), 88 (3), 89 (3), 90 (3), 91 (3), 92 (4), 93 (3), 94 (3).  
 Dress, W. J.—1121 (3).  
 Ealey, E. H. M.—E.119 (1).  
 Eardley, E. C. W.—s.n. (6).  
 Eaton, H. G.—s.n. (5).  
 Eddy, N. G.—NT.5289 (18); s.n. (4).  
 Edelfelt, E. G.—251 (5), 253 (5).  
 Ellen, H. E.—122 (3).  
 Engineer for Railways—(5).  
 Epps, F. C.—100 (3), 117 (5).  
 Everist, S. L.—3340 (18), 3876 (6), 3877 (6), 5120 (1), 5264 (1), 5284 (4), 5333 (6); s.n. (3), (12).  
 Everist, S. L., & Johnson, R. W.—3 (1).  
 Faber, F. C.—2 (2).  
 Fawcett, L.—13 (4), 14 (1).  
 Fielding, A.—s.n. (3).  
 Fitzalan, E. F. A.—s.n. (1), (3), (4), (5).  
 Fitzgerald, W. V.—417 (4), 456 (6), 1116 (6), 1258 (7), 1566 (6); s.n. (1), (4), (6), (18).  
 Fletcher, J. J.—s.n. (3), (11).  
 Ford, N. C.—NSW.19973 (6).  
 Forde, N.—244 (6), 245 (6).  
 Forrest, J.—s.n. (6).  
 Forsten, E. A.—s.n. (2).  
 Forster, J. R., & J. G. A.—s.n. (3).  
 Francis, W. D.—s.n. (1), (4), (6).  
 Fraser, D.—F.26 (4), F.29 (4).  
 Froggatt, W. W.—92 (1), in NSW.20050 (4).  
 Gamble, J. S.—5811 A (2), 5811 B (2).  
 Gandoger, M.—s.n. (3).  
 Garden, J.—s.n. (2).  
 Gardner, C. A.—1043 (7), 1329 (1, 4), 1379 (1), 1473 (7), 1483 (6), 7072 (6), 7407 (6); s.n. (7).  
 Girdier, N.—s.n. (5).  
 Gittins, C. H.—474 (6), 823 (4), 827 (6).  
 Gleason, H. A.—482 (3).  
 Goodall, D. W.—s.n. (8).  
 Goy, D. A.—s.n. (3).

- Griffith, W.—1116 c (2); s.n. (2).  
 Griffiths, A.—3833 b (3), 4032 (3), 4050 (3), 4051 (3), 4052 (3), 4053 (3), 4097 (3), 4104 (3).  
 Griffiths, A., & Woolley, D. P.—4063 (3), 4064 (3), 4065 (3), 4066 (3).  
 Grove, C. H.—132 (12).  
 Guillaumin, A.—13358 (3).  
 Guillaumin, A., & Baumann-Bodenheim, M. B.—9912 (3), 12486 (3), 12487 (3), 12488 (3).  
 Gulliver, B.—s.n. (7).  
 Gwynne-Vaughan, D. T.—351 (2).
- Hall, W. T.—1 (6), 2 (1).  
 Hamilton, A. A.—s.n. (3), (11).  
 Harris, W.—s.n. (1).  
 Helms, R.—s.n. (3).  
 Hely, F. W.—s.n. (5).  
 Henderson, I. A.—s.n. (3).  
 Henne, D.—s.n. (4), (7).  
 Henrichson, E. F.—s.n. (7).  
 Hill, G. F.—104 (4), 238 (18), 340 (18), 403 (4), 420 (4), 453 (6).  
 Hill, W.—54 (6), 154 (4).  
 Hills, N. S.—QFD.53/111 (3), QFD.53/112 (4), QFD.53/113 (4).  
 Hodgson,—s.n. (3).  
 Holtze, N.—s.n. (4).  
 Home, D. N.—s.n. (6).  
 Hoogewerf, A.—3 (2), 22 (2), 49 (4), 50 (4), 55 (4), 58 (2).  
 Hoogland, R. D.—8485 (6), 8500 (1), 8513 (1), 8514 (7), 8520 (3).  
 Hubbard, C. E.—2306 (3), 2325 (3), 2958 (3), 3353 (3), 3441 (3), 4625 (3), 7339 (7).  
 Hubbard, C. E., & Winders, C. W.—6523 (4), 6749 (7), 6967 (7), 6976 (7).  
 Hulse, C.—s.n. (1).  
 Hume, E. G.—s.n. (3).  
 Hyland, B.—2496 (3), 2503 (7).
- Illingworth, J. F.—89 (1); s.n. (4).  
 Irby, L. G.—s.n. (3).
- Jackson, M. F. C.—NGF.2739 (4), NGF.2745 (5).  
 Jacobs, M. R.—15 (4), 39 A (1), 50 (6), 115 (6).  
 Jaheri,—s.n. (2).  
 Johnson, L. A. S.—290 (3), 785 (11), in NSW.20052 (3); s.n. (12).
- Johnson, R. G.—s.n. (4).  
 Johnson, R. W.—1028 (6).
- Kajewski, S. F.—1303 (1); s.n. (3).  
 Kaudern, W.—s.n. (3).  
 Keast, A.—1 (1), 2 (4), 3 (2).  
 Keefer, G. D.—5 (1), 162 (4); s.n. (6).  
 Kellogg, J. H.—s.n. (2).  
 Kenny, F. H.—s.n. (3).  
 Kerr, A. F. G.—3693 (2), 9575 (2), 11630 (2), 13706 (2), 13737 (2), 15111 (2), 15701 (2).  
 Keys, J.—60 (3).  
 King, J.—s.n. (11).  
 Kornassi—1144 (1).  
 Korthals, R. W.—s.n. (2).
- Labillardière, J. J. (Billardière, J. J. M. de la)—s.n. (3).  
 Lakshnakara, M. C.—535 (2).  
 Lam, H. J.—7257 (3).  
 Lane-Poole, C. E.—484 (1).  
 Langfield, E. C. B.—88 (7), 106 (7), 113 (7), 115 (7), 130 (7), 317 (1).  
 Laseron, C. F.—s.n. (3).  
 Lazarides, M.—4280 (4), 6241 (18), 6401 (6), 6419 (7), 6428 (18), 6492 (2), 6526 (7), 6552 (7), 6560 (6), 6564 (6), 6568 (4), 6893 (7).  
 Le Boucher,—in Cribb—1539 (3).  
 Leichhardt, F. W. L.—s.n. (3).  
 Lestang, A. de—246 (4), 362 (4), 477 (6).  
 Lightfoot, T. M.—s.n. (3).  
 Little, I.—s.n. (3).  
 Lörzing, J. A.—10161 (1), 12058 (1).  
 Lucas, A. H. S., & Hamilton, A. A.—s.n. (3).
- McAuliffe, D. W.—1 (3), 2 (3), 4 (3).  
 MacDaniells, L. H.—230 (3), 2062 (3), 2337 (3), 2558 (3); s.n. (3).  
 MacGillivray, W.—2177 (6), 2177 A (1).  
 MacGillivray, D.—290 (12).  
 MacGregor, W.—s.n. (2), (3), (4).  
 McKee, H. S.—1063 (3), 10595 (3), 10735 (3).  
 McKinlay, J.—s.n. (4).  
 Macnae, W.—s.n. (3).  
 Macpherson, K. A.—79 in NQNC.2740 (1), 79 A in NQNC.2741 (1), in NQNC.770 (5), in NQNC.2768 (6).  
 Maiden, J. H.—s.n. (3).  
 Main, T. W.—525 (1).  
 Manski, M. J.—s.n. (4).

- Marcan, A.—225 (2).  
 Martion, L., in hb. Cambage—4158 (4).  
 Meebold, A.—7983 (3).  
 Menzies, B. K.—s.n. (2).  
 Messmer, P. R.—s.n. (1), (4).  
 Michael, N.—304 (8), 465 (6), 496 (3),  
     667 (1), 706 (5), 1042 (1).  
 Mitchell, T. L.—241 (6).  
 Mondih (Mondi)—83 (2).  
 Moore, C.—s.n. (3).  
 Morris, A.—1220 (11).  
 Morrison, A.—L.163 (7).  
 Mueller, F. J. H. (von)—s.n. (2), (3), (4),  
     (7), (18).  
 Musgrave, A.—s.n. (4).  
 Muspratt, J.—90 (7).  
 Myers, R. J.—s.n. (4).  
  
 Née, L.—s.n. (3).  
 Nernst, J.—s.n. (3).  
 Neth. Ind. For. Serv. bb.—9561 (2), 21478  
     (2), 21482 (2), 21512 (2), 21813 (1),  
     22322 (1), 24744 (2), 26357 (2).  
 NGF.—2739 (4), 2745 (5), 2776 (3), 4205  
     (5), 8223 (2), 8224 (2), 10387 (4),  
     10393 (4), 10420 (4), 10434 (2).  
 Niona, I.—s.n. (3).  
 N.S.W. Forest Commission—2301 (1).  
  
 Olle, A. D.—s.n. (3).  
 O'Shanesy, P. A.—127 (6).  
 Oxenford, R. A.—s.n. (4).  
  
 Parker, R. N.—2678 (2), 3165 (2); s.n. (2).  
 Passlow, T.—s.n. (6).  
 Paterson, G.—s.n. (7).  
 Pedley, L.—272 (7), 1128 (7); s.n. (3).  
 Penfold, A. R.—s.n. (3).  
 Perkins, E. H.—QFD.53/1 (3).  
 Perry, R. A.—601 (4), 671 (18), 820 (6),  
     1023 (1), 1075 (7), 1118 (4), 1125 (4),  
     1334 (8), 1335 (4), 1652 (6), 1832 (6),  
     1869 (6), 1900 (6), 1943 (7), 2010 (4),  
     2145 (6), 2260 (4), 2401 (18), 2460  
     (18), 2467 (6), 2608 (6), 2627 (7),  
     2683 (18), 2719 (18), 2981 (6), 3149  
     (7), 3535 (7), 3566 (6) 3596 (6), 3687  
     (6), 3773 (6), 3921 (4), 3925 (6), 3927  
     (6), 3948 (6), 4523 (6), 4524 (6).  
 Persieh, W. A.—33 (9), 55 (1), 44 (4),  
     84 (9).  
 Petrie, W. R.—4 (5), 100 (3); s.n. (1).  
  
 Pierre, L.—1158 (2).  
 Pleyte, D. R.—841 (1), 977 (1).  
 Popenoe, W.—310 (3).  
 Praetorius, C. F. E.—s.n. (2).  
 Prentice, C.—s.n. in hb. Simmonds (3).  
 Put—835 (2).  
  
 Queensland Naturalists' Club—s.n. (3).  
  
 Rabil—23 (2).  
 Reinwardt, C. G. C.—1462 (1).  
 Ridley, H. N.—s.n. (2).  
 Ridley, W. F.—QSC.53 (5), QSC.261 (3).  
 Roberts, J. F.—s.n. (3).  
 Robertson, W. N.—s.n. (4).  
 Roberty, G.—6012 (3), 17805 (3).  
 Robinson, C. B.—1012 (2), 1092 (2).  
 Roff, C.—2 (7), 4 (5), 6 (5), 11 (4).  
 Ronlund, F. I. R.—QFD.62/339 (7).  
 Rossiter, J.—s.n. (3).  
 Royen, P. van—4649 (5), 4762 (1).  
 Rust, D. W.—3a (4); s.n. (6).  
 Rutten, L. M. R.—1654 (2).  
  
 St. John, H.—24240 (6).  
 Salmon, A. A.—s.n. (1).  
 SAN—26601 (2), 32557 (2).  
 Sasaki, S.—s.n. (3).  
 Schaeffe, R., in hb. F. A. Rodway—3291 (4).  
 Schlechter, R.—15016 (3).  
 Schlesich bot. Tauschverein—854 (2).  
 Schodde, R.—3358 (5).  
 Schultz, F.—417 (6), 500 (1), 512 (7),  
     543 (7), 554 (7).  
 Seibert, R. J.—1426 (3).  
 SFN: see Sinclair  
 Shaw, N. H.—s.n. (6).  
 Sheehan, T. J.—s.n. (3).  
 Sieber, F. W.—319 (3).  
 Siemsson, T.—241 (3).  
 Simmonds, J. H.—s.n. (3).  
 Simmons, H. G.—s.n. (4).  
 Simmons, R.—s.n. (1), (6), (7).  
 Sinclair, J.—SFN.38861 (2).  
 Singh, J., & Mejer, W.—SAN.26601 (2).  
 Smith, C.—9013 (2).  
 Smith, Ch.—302 (1), 303 (2).  
 Smith, F. R.—s.n. (11).  
 Smith, F. W.—s.n. (6).  
 Smith, J. H.—s.n. (1).



- Smith, L. S.—T.37 (4), T.38 (6), 3905 (4), 4145 (3), 4147 (5), 4301 (1), 4336 (6), 4337 (4), 4393 (7), 10301 (1), 10358 (6), 10567 (6), 10569 (9), 11166 (10), 11622 (1), 11624 (4), 11699 (7), 11980 (4), 12021 (6).
- Snowden, J. D.—1815 (3).
- Specht, R. L.—414 (2), 630 (4), 631 (2), 632 (4), 875 (2), 1027 (5), 1118 (7), 1272 (4), 1274 (6).
- Speck, N. H.—1604 (5), 1626 (6), 4718 (4), 4782 (6), 4903 (7), 4929 (6), 5017 (7).
- Spencer, W. B.—s.n. (1), (4), (6), (7).
- Steele, E. B.—s.n. (7).
- Steenis, C. G. G. J. van—10569 (2).
- Stevens, S. R.—s.n. (1).
- Stirling, E. C.—s.n. (4).
- Stokes, S. J.—7 (6), 56 (1), 59 (4).
- Story, R., & Yapp, G. A.—29 (6), 74 (6), 81 (7), 122 (6), 172 (6).
- Sulman, F.—3 (6), 11 (4).
- Swain, E. H. F.—53 (3), A.53 (3).
- Tardent, J. L.—119 (6), 177 (4), 178 (4).
- Taylor, J. H.—81 (3).
- Teymann, J. E.—1 (1); s.n. (1), (2).
- Thomson, D. F.—31 (1).
- Thomson, T.—s.n. (2).
- Thozet, A.—45 (7).
- Thunberg, C. P.—s.n. (2).
- Tidestrom, I.—4167 (3).
- Tracey, J. G., & White, K. J.—5354 (7), 5356 (4), 5375 (8).
- Trapnell, W. G.—22 (6), 24 (4), 27 (4), 35A (4), 35B (4), 37 (4), 56 (4), 97 (7), 116 (1), 116A (4), 162 (7), 207 (7).
- Trezise, F.—s.n. (7).
- Tryon, H.—s.n. (3), (4).
- Tsiang Ying—187 (3).
- Vanpruck—765 (2).
- Verboom, W. C.—13 (2).
- Verreaux, J. P.—586 (3).
- Versteegh, C.—B.W.54 (2), B.W.56 (3), B.W.57 (4), B.W.58 (2), B.W.68 (5), B.W.90 (4).
- Vieillard, E.—450 (3), 451 (3).
- Volck, E.—1946 (7), 1947 (1), 1953 (4), 1954 (8), 1955 (8).
- Vriese, W. H. de—s.n. (1), (2).
- Walker, H. B.—s.n. (7).
- Wallich, N.—3645 (2), 3646 (1).
- Webb, L. J.—3180 (3).
- Webb, L. J. & Smith, L. S.—3329 (1).
- Webb, L. J. & Tracey, J. G.—3334 (1).
- Weber—s.n. (3).
- Welch, W.—s.n. (3).
- White, C. T.—233 (5), 1138 (5), 1369 (4), 1376 (7), 1377 (4), 1378 (4), 1382 (8), 1509 (4), 1626 (4), 2266 (3), 3243 (3), 3366 (1), 6383 (5), 6384 (3), 6503 (3), 6575 (3), 6736 (3), 7428 (3), 7630 (3), 8149 (1), 8153 (5), 8178 (3), 10567 (8), 11418 (3), 12104 (7), 12503 (7); s.n. (1), (3), (4), (5), (6), (7).
- White, K. J.—724 (8), 1262 (6), 1263 (4).
- White, K. J., & Gray, E.—NGF.10387 (4), NGF.10393 (4), NGF.10420 (4), NGF.10434 (2).
- White, S. A.—s.n. (3).
- Whitehouse, F. W.—s.n. (4), (7).
- Wilson, C. L.—614 (3), 647 (3), 662 (3).
- Williams, K. A. W.—s.n. (3).
- Williams, — —(11).
- Winkler, Hub.—3114 (2).
- Winkworth, R. E.—417 (18), 568 (4), 983 (18), 997 (18), 1000 (4).
- Womersley, J. S.—26 (2), NGF.2776 (3).
- Woodroffe, A. E. V.—s.n. (4).
- Woolls, W.—s.n. (3).
- Wyatt, R.—7 (1), 11 (6).
- Young, J. E.—s.n. (1), (4), (5).
- Zeeuw, C. de—s.n. (5).
- Zippelius, A.—s.n. (1).





FIG. 1. *Melaleuca leucadendron*, x 0.7 (Blake 22117).





FIG. 2. *Melaleuca cajuputi*, x 1 (Blake 17511 and Blake 21788).





FIG. 3. *Melaleuca quinquenervia*, x 1 (Blake 19789).







FIG. 4. *Melaleuca viridiflora*, x 0.7 (Blake 20210 and Blake 22087).





FIG. 5. *Melaleuca dealbata*, x 1 (Blake 17000, type).





FIG. 6. *Melaleuca nervosa*, x 1 (Blake 16344 and Blake 19564).







FIG. 7. *Melaleuca argentea*, x 1 (Blake 16695).





FIG. 8. *Melaleuca stenostachya*, x 1 (Blake 19566, type).





FIG. 9. *Melaleuca saligna*, x 1 (Blake 21799).





FIG. 10. *Melaleuca arcana*, x 1 (Blake 20260, type).







FIG. 11. *Melaleuca deanei*, x 1 (Cook's R., Hamilton).





FIG. 12. *Melaleuca groveana*, x 1 (Blake 19703).





FIG. 13. *Melaleuca sieberi*, x 1 (Blake 20933).





FIG. 14. Trees of *Melaleuca* spp.: A, *M. leucadendron* (Blake 22117); B, *M. cajuputi* (Specht 414); C, *M. quinquenervia* (trees near Brisbane, 15 m high); D, *M. viridiflora*, common form (Blake 19579), right and centre; DD, *M. viridiflora*, tall trees (Blake 17024) on ground periodically flooded to 1 m; E, *M. dealbata* (Blake 17000), trees 12 m high; F, *M. nervosa* (Blake 19343); G, *M. argentea* (Blake 19437), trees about 10 m high; H, *M. stenostachya* (Blake 19566).

Photos: A, C–M, S. T. Blake; B, R. L. Specht.





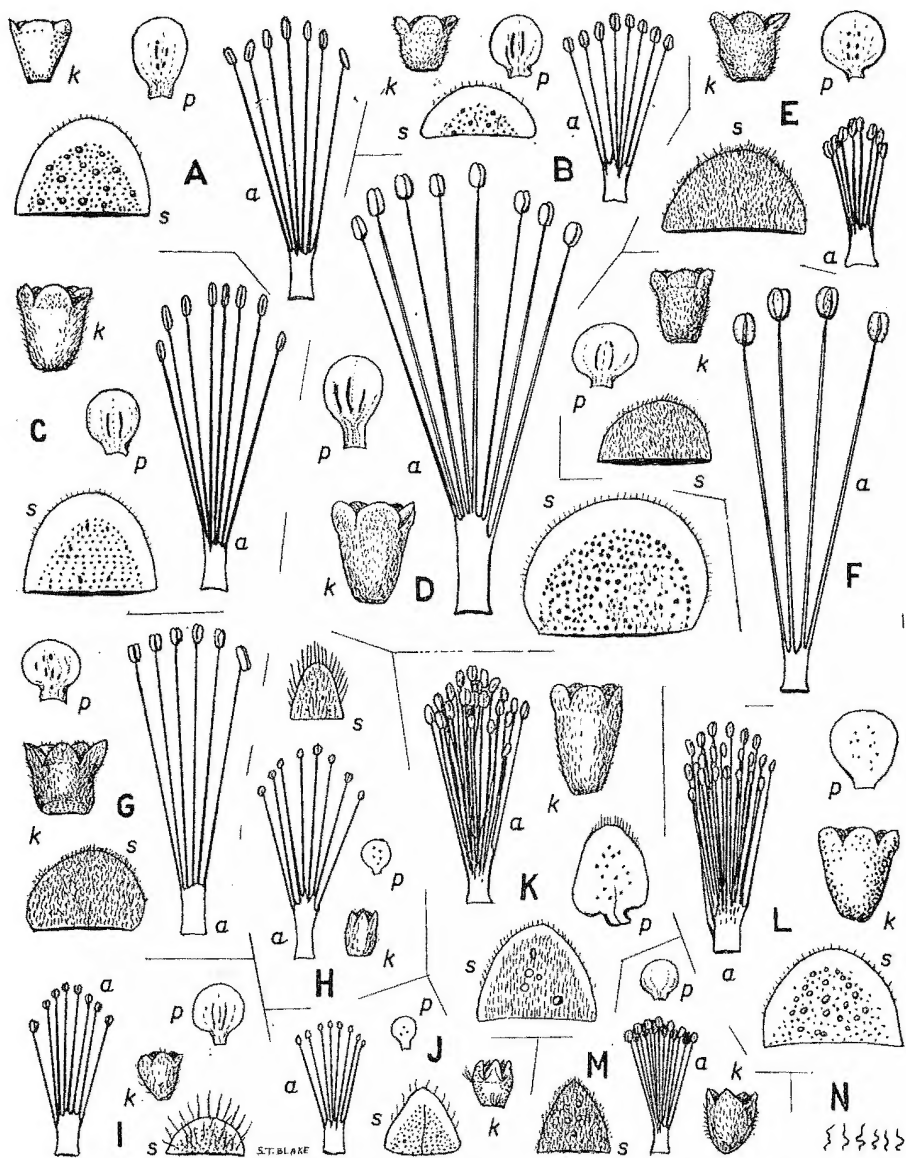
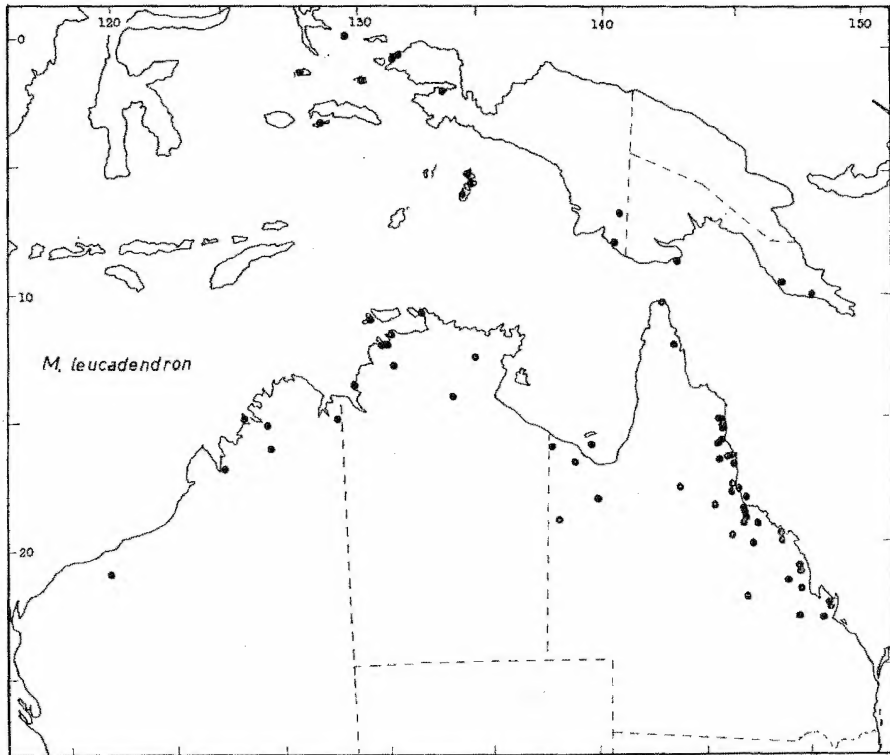
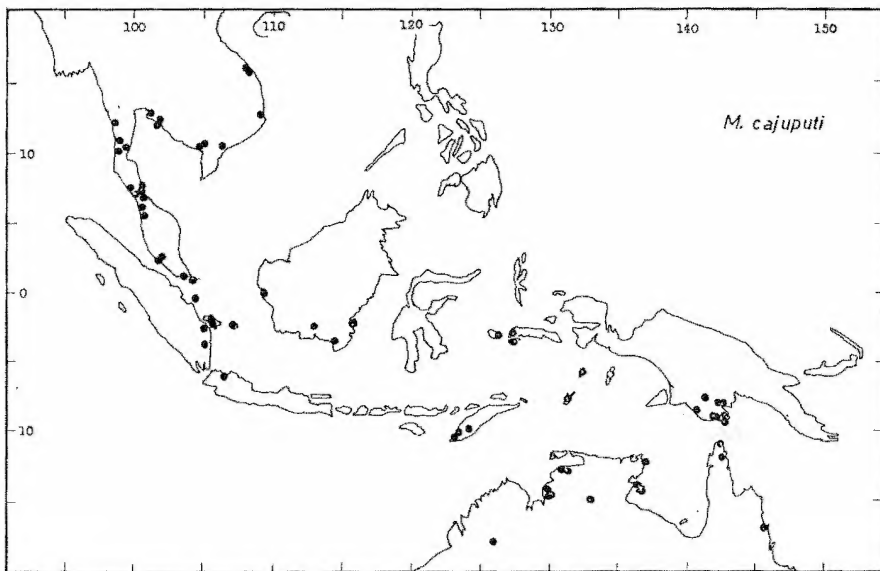
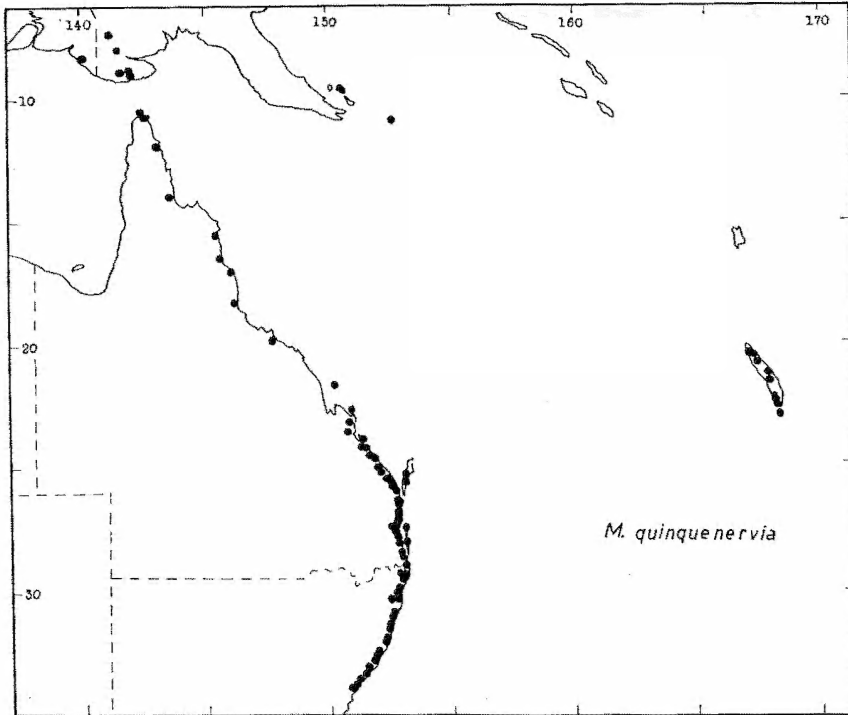
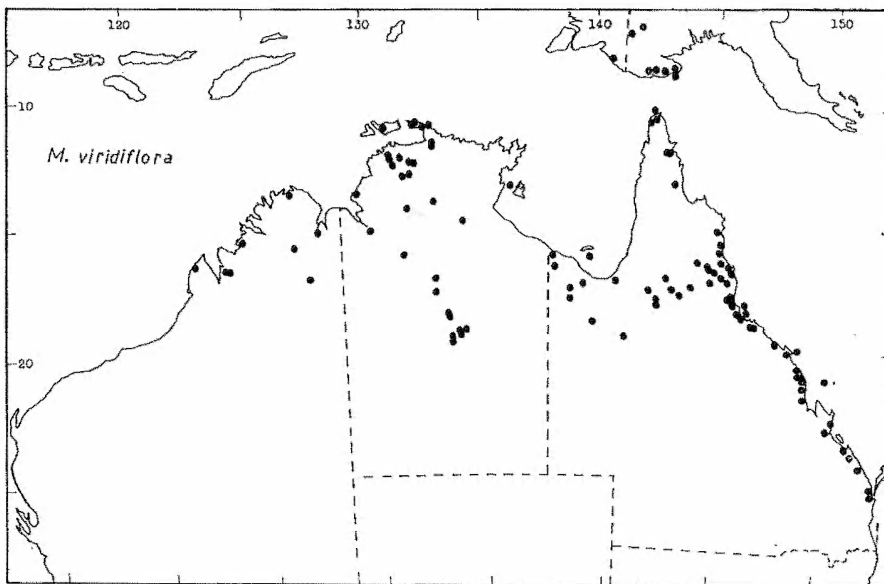
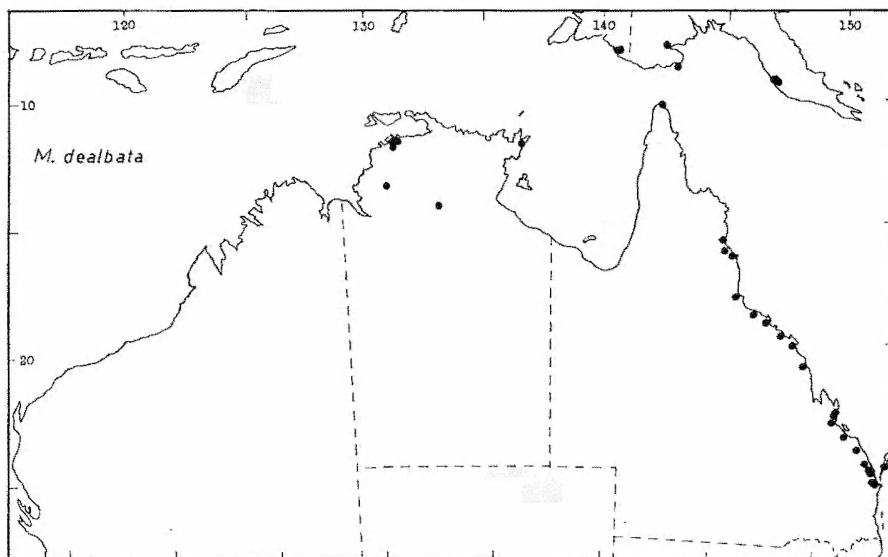
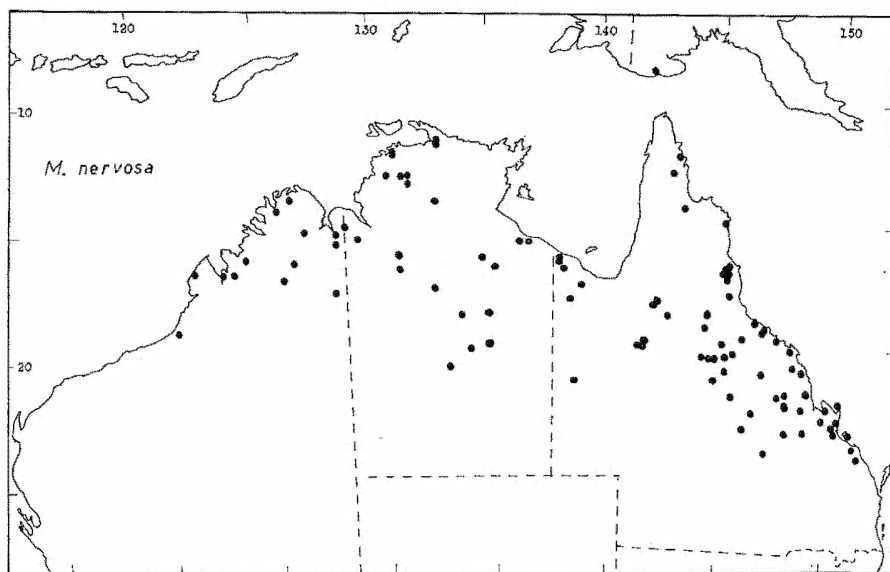


FIG. 15. A-M, floral details of *Melaleuca* spp.; calyx (k) x 3, petal (p) x 3, staminal bundle (a) x 3 and sepal (s), outside view x 10. A, *M. leucadendron* (Blake 22117); B, *M. cajuputi* (Blake 21788); C, *M. quinquenervia* (Blake 19789); D, *M. viridiflora* (Blake 20210); E, *M. dealbata* (Blake 17000, type); F, *M. nervosa* (Blake 19564); G, *M. argentea* (Blake 16695); H, *M. stenostachya* (Blake 19566, type); I, *M. saligna* (Blake 21799); J, *M. arcana* (Blake 20260, type); K, *M. deanei* (Cook's R., Hamilton); L, *M. groveana* (Blake 19703); M, *M. sieberi* (Blake 20993). N, crisped hairs of *M. dealbata* x 20.

FIG. 16. Distribution of *Melaleuca leucadendron*.FIG. 17. Distribution of *Melaleuca cajuputi*.

FIG. 18. Distribution of *Melaleuca quinquenervia*.FIG. 19. Distribution of *Melaleuca viridiflora*.

FIG. 20. Distribution of *Melaleuca dealbata*.FIG. 21. Distribution of *Melaleuca nervosa*.

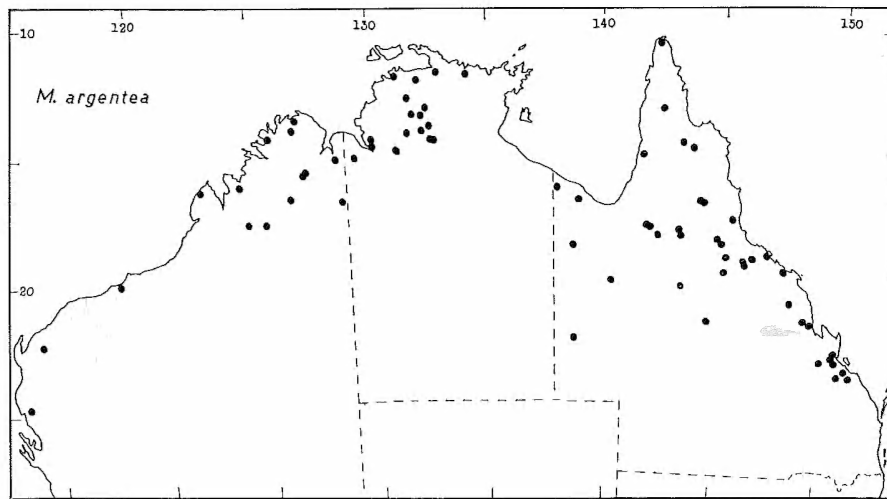


FIG. 22. Distribution of *Melaleuca argentea*.

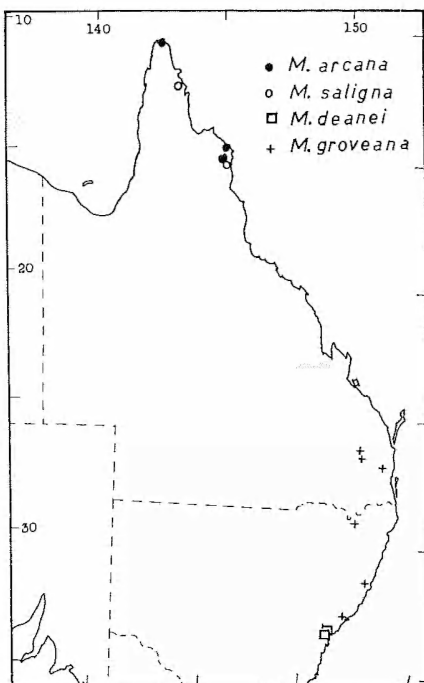


FIG. 23. Distribution of *Melaleuca arcana*, *M. saligna*, *M. deanei* and *M. groveana*.

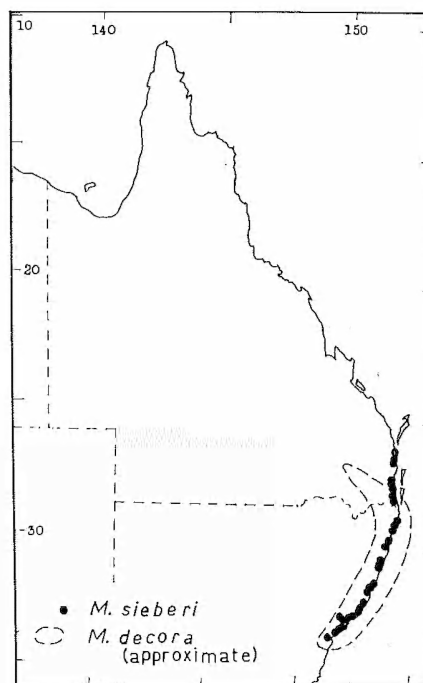


FIG. 24. Distribution of *Melaleuca sieberi* and *M. decora*.

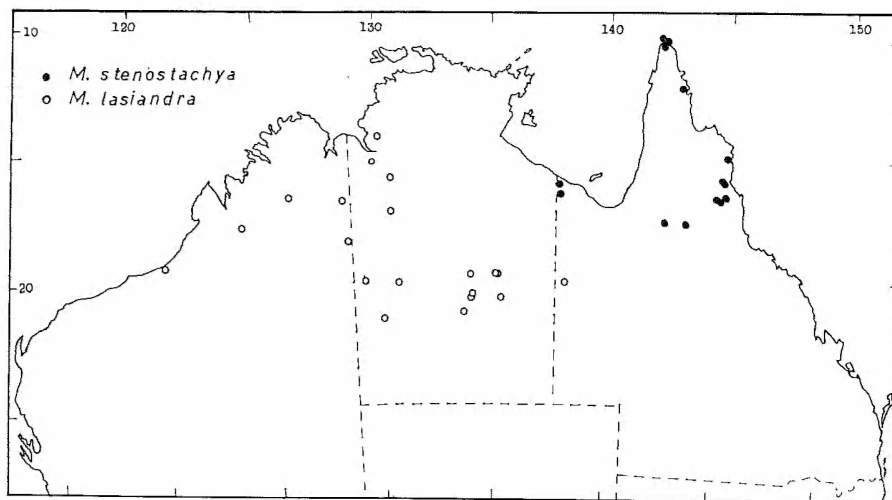


FIG. 25. Distribution of *Melaleuca stenostachya* and *M. lasiandra*.

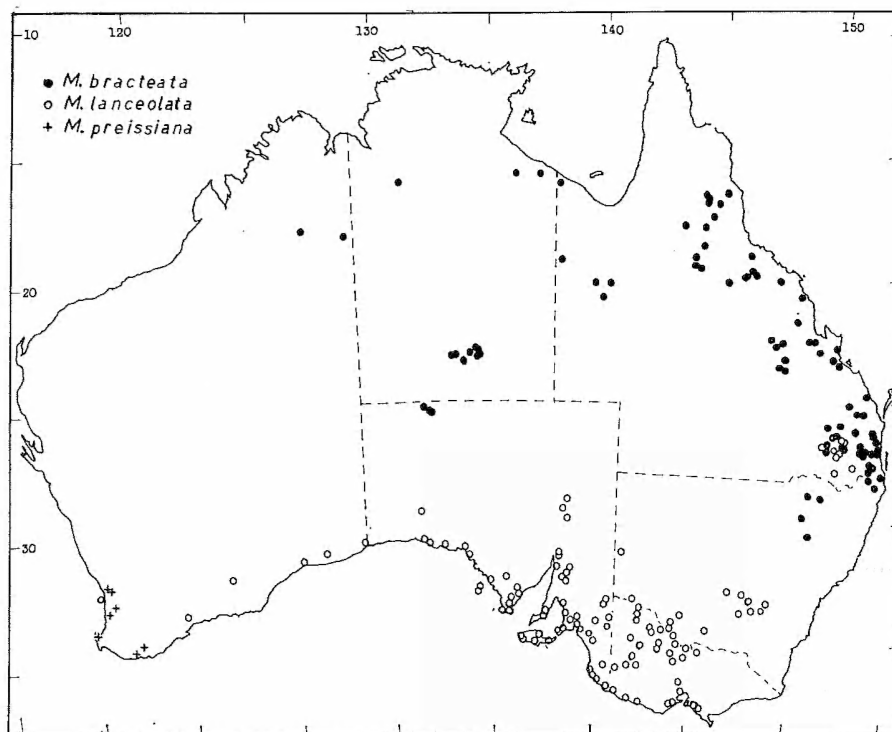


FIG. 26. Distribution of *Melaleuca bracteata*, *M. lanceolata* (partly after J. H. Willis, Vict. Nat. 65: 79 (1948)), and *M. preissiana*.